

## DESCRIPTION

## SKIN TREATMENT COMPOSITION

## 5 TECHNICAL FIELD

The present invention relates to a skin treatment composition. The skin treatment composition of the present invention is preferably used as a deodorizing skin treatment composition, 10 deodorizing cosmetic, antiperspirant cosmetic, odor eliminating cosmetic, etc., mainly for the purpose of deodorization.

(1) More specifically, the present invention relates to a skin treatment composition containing 15 anti-bacterial zeolite that has superior anti-discoloring properties.

(2) Even more specifically, it relates to a skin treatment composition that is a deodorizing cosmetic containing anti-bacterial zeolite and also is 20 superior in formulation stability such as anti-discoloring properties and dispersibility of powder components, as well as very superior in terms of tactile sensation during use.

(3) More specifically, the present invention relates 25 to a skin treatment composition containing

anti-bacterial zeolite that has superior anti-staining properties.

## BACKGROUND ART

### 5 [Invention of claim 1]

Anti-bacterial zeolite is blended into skin treatment compositions including cosmetics and quasi-drugs as a preservative and/or odor eliminating agent.

10 For example, a composition for anti-bacterial sprays (see Patent Document 1-1) and deodorizing cosmetics (see Patent Document 1-2) containing anti-bacterial zeolite have been developed. Also, technology that blends silicone into anti-bacterial  
15 zeolite as a deodorizing cosmetic with improved anti-discoloring properties has been disclosed (see Patent Document 1-3).

Patent Document 1-1: Japanese Patent Laid-Open No. Sho 63-250325 bulletin

20 Patent Document 1-2: Japanese Patent Laid-Open No. Hei 8-26956 bulletin

Patent Document 1-3: Japanese Patent Laid-Open No. Hei 8-92051 bulletin

25 Anti-bacterial zeolite by itself is a stable ingredient for a skin treatment composition.

However, blending anti-bacterial zeolite into a skin treatment composition sometimes causes discoloration.

The cause of this discoloration is not clear; 5 there are many raw materials in a skin treatment composition and reactions with such raw materials or their impurities are believed to cause subtle discoloration.

For example, the inventors verified that 10 blending anti-bacterial zeolite as a preservative or odor eliminating agent into an antiperspirant cosmetic containing chlorhydroxy aluminum causes discoloration that is not preferable for the cosmetic's appearance. Also, the inventors verified 15 that blending anti-bacterial zeolite in a skin treatment composition containing various surfactants results in undesirable discoloration.

In view of the aforementioned problem, the inventors conducted earnest research and amazingly 20 discovered that trisalt ethylenediaminehydroxyethyl triacetate has an anti-discoloration effect on anti-bacterial zeolite in skin treatment compositions and thus completed the present invention.

25 The object of the present invention is to

provide a skin treatment composition containing anti-bacterial zeolite that has the superb effect of preventing discoloration of skin treatment compositions and/or reducing the degree of  
5 discoloration.

[Invention of claims 2-6]

Anti-bacterial zeolite powder is blended into skin treatment compositions including cosmetics and  
10 quasi-drugs as a preservative and/or odor eliminating agent.

For example, a composition for anti-bacterial sprays (see Patent Document 2-1) and deodorizing cosmetics (see Patent Document 2-2) containing  
15 anti-bacterial zeolite have been developed. Also, technology that blends silicone into anti-bacterial zeolite as a deodorizing cosmetic with improved anti-discoloring properties has been disclosed (see Patent Document 2-3).

20 A disposable sheet-shaped cosmetic has been developed as an antiperspirant cosmetic containing alum (see Patent Document 2-4).

Patent Document 2-1: Japanese Patent Laid-Open No.  
Sho 63-250325 bulletin

25 Patent Document 2-2: Japanese Patent Laid-Open No.

Hei 8-26956 bulletin

Patent Document 2-3: Japanese Patent Laid-Open No.

Hei 8-92051 bulletin

Patent Document 2-4: Japanese Patent Laid-Open No.

5 2001-114660 bulletin

A deodorizing cosmetic is a cosmetic that is used to prevent or control emanation and/or secretion of offensive body odor, or to eliminate the emanated and/or secreted components. In terms of the product 10 form, it is commonly used as a lotion, cream, powder, stick, aerosol, etc.

Body odor is odor caused by decomposition of perspiration. The following methods are available for preventing body odor arising with perspiration.

15 (1) Deodorizing method utilizing astringent actions

This method indirectly prevents body odor by suppressing perspiration through a strong astringent action. For example, astringent agents such as zinc sulfocarbolate, citric acid, and various aluminum 20 compounds are frequently used. Ethyl alcohol has an astringent action, too. Among them, an aluminum compound (chlorhydroxy aluminum) is used particularly frequently; for the aerosol type products, a complex with propylene glycol, which has 25 superior compatibility with freon gas, has been

developed.

(2) Deodorizing method utilizing bactericidal actions

Perspiration is decomposed and gives rise to  
5 odor due to the decomposing actions of bacteria.

Therefore, a bactericide can be used to prevent the growth of bacteria and thus directly prevent decomposition of perspiration and offensive odor.

For example, TMTD (tetramethyl thiuram disulfide),  
10 benzalconium chloride, halocalban, etc. are commonly used. In addition, zinc flower, essential oil, perfume, chlorophyll compounds, etc. also have an anti-bacterial action and exhibit a deodorizing effect.

15 (3) Deodorizing method utilizing masking actions

Normal body odor can be masked by perfume and/or cologne to eliminate the smell. Also, there are methods that blend the aforementioned bactericide in the perfume and/or cologne to promote the deodorizing  
20 effect.

The deodorizing cosmetics disclosed in Patent Documents 2-1 to 2-3 use a deodorizing method utilizing the bactericidal action of anti-bacterial zeolite. However, there was a problem in that a  
25 deodorizing cosmetic using anti-bacterial zeolite is

discolored and the product stability is difficult to maintain when an antiperspirant containing a halogen such as chlorhydroxy aluminum is used. Furthermore, there was a problem in terms of usability because it  
5 does not feel smooth on the skin. Therefore, development of a deodorizing cosmetic that has superior formulation stability, superior usability, and a good deodorizing effect is desired.

The object of the present invention is to  
10 provide a skin treatment composition that is superior in terms of the deodorizing effect in addition to formulation stability and usability.

In order to solve the aforementioned problem in view of the description above, the inventors  
15 conducted earnest research on the causes of discoloration and poor usability of conventional deodorizing cosmetics and discovered that the addition of a halogen compound such as chlorhydroxy aluminum, used as an antiperspirant, causes  
20 discoloration of the formulation and also causes inhomogeneity in the formulation, which leads to aggregation, causing a granular texture, resulting in poor usability. The inventors also discovered that the addition of alum or dried alum, instead of a  
25 halogen compound such as chlorhydroxy aluminum,

improves the formulation stability, eliminates the granular texture at the time of use, and gives a superior deodorizing effect, and thus completed the present invention.

5       Conventional deodorizing cosmetics containing anti-bacterial zeolite do not have satisfactory formulation stability in terms of dispersibility and discoloration when a large amount of a halogen-containing compound such as chlorhydroxy aluminum is added. It is believed that the anti-bacterial metal in the anti-bacterial zeolite interacts with the antiperspirant such as chlorhydroxy aluminum to cause discoloration. The most important point of the present invention is the discovery of the fact that superior formulation stability and a superior tactile sensation on the skin during the use are achieved when alum or dried alum, which acts as an antiperspirant, is added in addition to anti-bacterial zeolite, which could never be predicted from conventional technology. In the present invention, an antiperspirant containing a halogen such as chlorhydroxy aluminum can be added as long as the blend ratio is within the range that virtually does not affect the product in terms of its dispersibility or discoloration, compared with the

blend ratios of anti-bacterial zeolite and alum and/or dried alum. In that case, the blend ratio of the antiperspirant containing a halogen is preferably 5 mass % or less of the total amount of the skin  
5 treatment composition.

The reason why the tactile sensation during the use is superior in the present invention is believed to be stabilization of the formulation due to the improvement in the dispersibility; however the  
10 mechanism of action is not clear.

[Invention of claims 7-8]

Anti-bacterial zeolite is blended into skin treatment compositions including cosmetics and  
15 quasi-drugs as a preservative and/or odor eliminating agent.

For example, a composition for anti-bacterial sprays (see Patent Document 3-1) and deodorizing cosmetics (see Patent Document 3-2) containing  
20 anti-bacterial zeolite have been developed. Also, technology that blends silicone into anti-bacterial zeolite as a deodorizing cosmetic with improved anti-discoloring properties has been disclosed (see Patent Document 3-3).

25 However, there has been no report on skin

treatment compositions and/or cosmetics with improved anti-staining properties.

On the other hand, polyoxyethylene polyoxypropylene 2-decyltetradecyl ether is publicly known as a surfactant to be blended into cosmetics (see Patent Document 3-4).

Patent Document 3-1: Japanese Patent Laid-Open No.

Sho 63-250325 bulletin

Patent Document 3-2: Japanese Patent Laid-Open No.

10 Hei 8-26956 bulletin

Patent Document 3-3: Japanese Patent Laid-Open No.

Hei 8-92051 bulletin

Patent Document 3-4: Japanese Patent No. 3323339

bulletin

15 Anti-bacterial zeolite by itself is a stable ingredient for a skin treatment composition.

However, when anti-bacterial zeolite is blended into a skin treatment composition, discoloration occurs and clothing can be stained if this adheres to 20 the clothing.

The cause of this discoloration is not clear; there are many raw materials in a skin treatment composition and reactions with such raw materials or their impurities are believed to cause subtle 25 discoloration.

For example, the inventors verified that blending anti-bacterial zeolite as a preservative or odor eliminating agent in an antiperspirant cosmetic containing chlorhydroxy aluminum causes 5 discoloration that is not preferable for the cosmetic's appearance.

The inventors also verified that perspiration and sunlight can cause undesirable discoloration in an antiperspirant cosmetic and clothing is stained if 10 this adheres to it.

In view of the aforementioned problem, the inventors conducted earnest research and amazingly discovered that anti-bacterial zeolite and polyoxyethylene polyoxypropylene 2-decyldodecyl ether, when used together, have an anti-staining 15 effect and thus completed the present invention.

The object of the present invention is to provide a skin treatment composition containing anti-bacterial zeolite that has the superb effect of 20 preventing the staining of clothes.

#### DISCLOSURE OF INVENTION

[Invention of claim 1]

That is, the present invention provides a skin 25 treatment composition comprising anti-bacterial

zeolite and trisalt ethylenediaminehydroxyethyl triacetate.

[Invention of claims 2-6]

That is, the present invention provides a skin treatment composition comprising anti-bacterial zeolite and alum and/or dried alum.

Also, the present invention provides the aforementioned skin treatment composition wherein the content of said anti-bacterial zeolite is 0.1-90 mass % of the total amount of the skin treatment composition.

Furthermore, the present invention provides the aforementioned skin treatment composition wherein the content of said alum and/or dried alum is 0.1 or more in terms of the mass ratio to said anti-bacterial zeolite.

Also, the present invention provides the aforementioned skin treatment composition wherein the content of said anti-bacterial zeolite is 0.1-70 mass % of the total amount of the deodorizing cosmetic and the content of said alum and/or dried alum is 0.01-80 mass % of the total amount of the skin treatment composition.

Furthermore, the present invention provides the aforementioned skin treatment composition wherein

the average particle size of said anti-bacterial zeolite is 10 micrometers or less, the particle size distribution is such that 20% or less of the particles have a particle size larger than 15 micrometers, and  
5 the average particle size of said alum and/or dried alum is 0.01-50 micrometers.

[Invention of claims 7-8]

That is, the present invention provides a skin treatment composition comprising anti-bacterial  
10 zeolite and polyoxyethylene polyoxypropylene 2-decyltetradecyl ether.

Also, the present invention provides the aforementioned skin treatment composition wherein the polyoxyethylene unit of the polyoxyethylene  
15 polyoxypropylene 2-decyltetradecyl ether is 20-28 E.O. and the polyoxypropylene unit is 10-16 P.O.

#### BEST MODE FOR CARRYING OUT THE INVENTION

The present invention is described in detail  
20 below.

[Invention of claim 1]

The anti-bacterial zeolite used in the present invention is zeolite that holds anti-bacterial metal ions in its ion-exchangeable parts; i.e. zeolite  
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whose exchangeable ions are partly or entirely replaced by an anti-bacterial metal. In the present invention, zeolite having ammonium ion substitution in addition to anti-bacterial metal ion substitution 5 is also preferable.

For the zeolite, either natural zeolite or synthetic zeolite can be used. Zeolite is aluminosilicate having a three dimensional skeletal structure; it is represented by the general formula 10  $XM_{2/n}O \cdot Al_2O_3 \cdot YSiO_2 \cdot ZH_2O$ . In this general formula, M denotes an exchangeable ion, usually a monovalent or divalent metal ion. n denotes the atomic valence of the (metal) ion. X and Y denote metal oxide and the silica factor, respectively, and Z denotes the number 15 of the crystallization water molecules.

Specific examples of zeolite include A-type zeolite, X-type zeolite, Y-zeolite, T-type, high silica zeolite, sodalite, mordenite, analcime, crinptyrolite, chabasite, and erionite. The ion exchange capacity of these zeolites are: 7 meq/g for 20 A-type zeolite, 6.4 meq/g for X-type zeolite, 5 meq/g for Y-zeolite, 3.4 meq/g for T-type, 11.5 meq/g for sodalite, 2.6 meq/g for mordenite, 5 meq/g for analcime, 2.6 meq/g for crinptyrolite, 5 meq/g for 25 chabasite, and 3.8 meq/g for erionite. Any of these

has enough capacity for ion exchange with anti-bacterial metal ions and/or ammonium ions.

Examples of exchangeable ions in zeolite include sodium ions, calcium ions, potassium ions, 5 magnesium ions, and iron ions. Examples of the anti-bacterial metal ions to use to substitute these ions include silver, copper, zinc, mercury, tin, lead, bismuth, cadmium, chromium, and thallium ions; preferably silver, copper, or zinc ions, and more 10 preferably silver ions.

In terms of anti-bacterial action, the content of the anti-bacterial metal ions is preferably 0.1-15 mass % in the zeolite. For example, anti-bacterial zeolite containing 0.1-15% of silver ions and 0.1-8 15 mass % of copper ions or zinc ions is preferable. On the other hand, zeolite can contain up to 20 mass % of ammonium ions; however, for the purpose of effectively preventing discoloration of the zeolite, 0.5-5% is preferable and 0.5-2 mass % is more 20 preferable. "Mass %" means the mass percentage in 110°C dry standard zeolite.

In the present invention, commercial products can be used for the anti-bacterial zeolite; the anti-bacterial zeolite can also be prepared by the 25 following method, for example. That is, zeolite is

exposed to a mixed solution containing anti-bacterial metal ions such as silver ions, copper ions, and zinc ions, prepared in advance, to substitute the aforementioned ions for the exchangeable ions in the 5 zeolite. The exposure can be achieved by the batch method or continuous method (column method, for example) for 3-24 hours, preferably 10-24 hours, at 10-70°C, preferably 40-60°C. The pH of the aforementioned mixed solution should be adjusted to 10 3-10, preferably 5-7. This adjustment is preferable because precipitation of silver oxide and such on the surface or in the pores of the zeolite can be prevented by this. Each ion in the mixed aqueous solution is usually supplied in the form of a salt. For example, 15 silver ions are from silver nitrate, silver sulfate, silver perchlorate, diamminesilver nitrate, diamminesilver sulfate, etc.; copper ions are from copper nitrate (II), copper perchlorate, copper acetate, potassium tetracyanocuprate, copper sulfate, etc.; zinc ions are from zinc nitrate (II), zinc sulfate, zinc perchlorate, zinc thiocyanate, zinc acetate, etc.; mercury ions are from mercury perchlorate, mercury nitrate, and mercury acetate; tin ions are from tin sulfate and such; lead ions are 20 from lead sulfate, lead nitrate, etc.; bismuth ions 25 from lead sulfate, lead nitrate, etc.; bismuth ions

are from bismuth chloride, bismuth iodide, etc.; cadmium ions are from cadmium perchlorate, cadmium sulfate, cadmium nitrate, and cadmium acetate; chromium ions are from chromium perchlorate, chromium 5 sulfate, chromium ammonium sulfate, chromium nitrate, etc.; thallium ions are from thallium perchlorate, thallium sulfate, thallium nitrate, thallium acetate, etc.

The anti-bacterial metal ion content in the 10 zeolite can be controlled by adjusting the concentration of each ion (salt) in said mixed aqueous solution. For example, in the case of anti-bacterial zeolite containing silver ions, an anti-bacterial zeolite with a silver ion content of 0.1-5% can be 15 obtained by adjusting the silver ion concentration in said mixed aqueous solution to 0.002M/l-0.15M/l. In the case of anti-bacterial zeolite additionally containing copper ions and zinc ions, an anti-bacterial zeolite with a copper ion content of 20 0.1-8% and a zinc ion content of 0.1-8% can be obtained by adjusting the silver ion concentration to 0.1M/l-0.85M/l and the zinc ion concentration to 0.15M/l-1.2M/l in said mixed aqueous solution. For 25 ion exchange of anti-bacterial zeolite, it is also possible to use solutions each of which contains each

ion and expose the zeolite with these solutions one after another. The concentration of each ion in each aqueous solution can be determined based on the concentration of each ion in said mixed aqueous

5 solution.

After the completion of the ion exchange, the zeolite is thoroughly rinsed and then dried. The drying is preferably conducted at 105°C-115°C, or under a reduced pressure (1-30 Torr) at 70-90°C.

10 Ion exchange for organic ions and/or for ions for which there isn't adequate water soluble salts, such as tin and bismuth, can be done by using an organic solvent solution such as alcohol and acetone to prevent precipitation of slightly soluble basic  
15 salts.

The blend ratio of the anti-bacterial zeolite in the skin treatment composition is not limited in particular. It is determined based on the reason why the anti-bacterial zeolite is added and also on the  
20 product form of the skin treatment composition.

For example, when blended in as a preservative, the blend ratio is usually 0.05-10 mass % of the total amount of the skin treatment composition. As another example, when blended in as a bactericide, the blend  
25 ratio is usually 0.1-90 mass % of the total amount of

the skin treatment composition, depending on the product form. For example, for lotion or cream type skin treatment compositions 0.1-20 mass % of the total amount of the skin treatment composition is  
5 preferable; for powder type skin treatment compositions 0.5-80 mass % of the total amount of the skin treatment composition is preferable; for stick type skin treatment compositions 0.5-60 mass % of the total amount of the skin treatment composition is  
10 preferable; and for spray type skin treatment compositions 0.5-50 mass % of the total amount of the skin treatment composition is preferable.

The trisalt ethylenediaminehydroxyethyl triacetate used in the present invention is a prior art skin treatment composition ingredient used as a chelating agent. Examples of the salt include alkali metal salts such as sodium and potassium; sodium salt is preferable. Commercial products such as Clewat OH-300 (Teikoku Kagaku Sangyo Co., Ltd.) are used.  
15 Dry powder of trisalt ethylenediaminehydroxyethyl triacetate is blended into the skin treatment composition of the present invention usually in the form of trihydrate.  
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In the present invention, trisalt ethylenediaminehydroxyethyl triacetate specifically  
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acts as an anti-discoloration agent for a skin treatment composition containing anti-bacterial zeolite. EDTA-3Na and such, which are well known as a chelating agent and have a chemical structure 5 similar to that of trisalt ethylenediaminehydroxyethyl triacetat such as trisodium ethylenediaminehydroxyethyl triacetate, do not have the anti-discoloration effect for skin treatment compositions.

10 The blend ratio of the trisalt ethylenediaminehydroxyethyl triacetate is determined based on the blend ratio of the anti-bacterial zeolite and the product form. It is usually 0.01-5 mass % (unhydrated equivalent) of the 15 total amount of the skin treatment composition.

When using the skin treatment composition of the present invention for applications such as odor eliminating agents and antiperspirant cosmetics, it is preferable to blend in an aluminum compound that 20 is an antiperspirant.

In addition to the aforementioned essential ingredients, other ingredients commonly used in skin treatment compositions, for example one, two or more of those listed below, are blended in as necessary in 25 the skin treatment composition of the present

invention; the preparation can be conducted for the target formulation with a conventional method.

[Invention of claims 2-6]

5       The anti-bacterial zeolite used in the present invention is zeolite powder that holds anti-bacterial metal ions in its ion-exchangeable parts; i.e. zeolite powder whose exchangeable ions are partly or entirely replaced by anti-bacterial metal. In the  
10 present invention, zeolite having ammonium ion substitution in addition to anti-bacterial metal ion substitution is also preferable.

For the zeolite, either natural zeolite or synthetic zeolite can be used. Zeolite is  
15 aluminosilicate having a three dimensional skeletal structure; it is represented by the general formula  $XM_{2/n}O \cdot Al_2O_3 \cdot YSiO_2 \cdot ZH_2O$ . In this general formula, M denotes an exchangeable ion, usually a monovalent or divalent metal ion. n denotes the atomic valence of  
20 the (metal) ion. X and Y denote metal oxide and the silica factor, respectively, and Z denotes the number of the crystallization water molecules.

Specific examples of zeolite include A-type zeolite, X-type zeolite, Y-zeolite, T-type, high  
25 silica zeolite, sodalite, mordenite, analcime,

crinptyrolite, chabasite, and erionite. The ion exchange capacity of these zeolites are: 7 meq/g for A-type zeolite, 6.4 meq/g for X-type zeolite, 5 meq/g for Y-zeolite, 3.4 meq/g for T-type, 11.5 meq/g for 5 sodalite, 2.6 meq/g for mordenite, 5 meq/g for analcime, 2.6 meq/g for crinptyrolite, 5 meq/g for chabasite, and 3.8 meq/g for erionite. Any of these has enough capacity for ion exchange with anti-bacterial metal ions and/or ammonium ions.

10 Examples of exchangeable ions in zeolite include sodium ions, calcium ions, potassium ions, magnesium ions, and iron ions. Examples of the anti-bacterial metal ions to use to substitute these ions include silver, copper, zinc, mercury, tin, lead, 15 bismuth, cadmium, chromium, and thallium ions; preferably silver, copper, or zinc ions, and more preferably silver ions.

The content of the anti-bacterial metal ions is preferably 0.1-15 mass % of the zeolite. For example, 20 anti-bacterial zeolite containing 0.1-15% of silver ions and 0.1-8 mass % of copper ions or zinc ions is preferable. On the other hand, zeolite can contain up to 20 mass % of ammonium ions; however, for the purpose of effectively preventing discoloration of 25 the zeolite, 0.5-5 mass % is preferable and 0.5-2

mass % is more preferable. "Mass %" means the mass percentage in 110°C dry standard zeolite.

In the present invention, commercial products can be used for the anti-bacterial zeolite. The 5 anti-bacterial zeolite is prepared, for example, as follows. That is, zeolite is exposed to a mixed solution containing anti-bacterial metal ions such as silver ions, copper ions, and zinc ions, prepared in advance, to substitute the aforementioned ions for 10 the exchangeable ions in the zeolite. The exposure can be achieved by the batch method or continuous method (column method, for example) for 3-24 hours, preferably 10-24 hours, at 10-70°C, preferably 40-60°C. The pH of the aforementioned mixed solution 15 should be adjusted to 3-10, preferably 5-7. This adjustment is preferable because precipitation of silver oxide and such on the surface or in the pores of the zeolite can be prevented by this. Each ion in the mixed aqueous solution is usually supplied in the 20 form of a salt. For example, silver ions are from silver nitrate, silver sulfate, silver perchlorate, diamminesilver nitrate, diamminesilver sulfate, etc.; copper ions are from copper nitrate (II), copper perchlorate, copper acetate, potassium 25 tetracyanocuprate, copper sulfate, etc.; zinc ions

are from zinc nitrate (II), zinc sulfate, zinc perchlorate, zinc thiocyanate, zinc acetate, etc.; mercury ions are from mercury perchlorate, mercury nitrate, and mercury acetate; tin ions are from tin sulfate and such; lead ions are from lead sulfate, lead nitrate, etc.; bismuth ions are from bismuth chloride, bismuth iodide, etc.; cadmium ions are from cadmium perchlorate, cadmium sulfate, cadmium nitrate, and cadmium acetate; chromium ions are from chromium perchlorate, chromium sulfate, chromium ammonium sulfate, chromium nitrate, etc.; thallium ions are from thallium perchlorate, thallium sulfate, thallium nitrate, thallium acetate, etc.

The anti-bacterial metal ion content in the zeolite can be controlled by adjusting the concentration of each ion (salt) in said mixed aqueous solution. For example, in the case of anti-bacterial zeolite containing silver ions, an anti-bacterial zeolite with a silver ion content of 0.1-5% can be obtained by adjusting the silver ion concentration in said mixed aqueous solution to 0.002M/l-0.15M/l. In the case of anti-bacterial zeolite additionally containing copper ions and zinc ions, an anti-bacterial zeolite with a copper ion content of 0.1-8% and a zinc ion content of 0.1-8% can be obtained

by adjusting the silver ion concentration to 0.1M/l-0.85M/l and the zinc ion concentration to 0.15M/l-1.2M/l in said mixed aqueous solution. For ion exchange of anti-bacterial zeolite, it is also 5 possible to use solutions, each of which contains each ion, and expose the zeolite to these solutions one after another. The concentration of each ion in each aqueous solution can be determined based on the concentration of each ion in said mixed aqueous 10 solution.

After the completion of the ion exchange, the zeolite is thoroughly rinsed and then dried. The drying is preferably conducted at 105°C-115°C, or under a reduced pressure (1-30 Torr) at 70-90°C.

15 Ion exchange for organic ions and/or for ions for which there isn't an adequate water soluble salt, such as tin and bismuth, can be done by using an organic solvent solution such as an alcohol or acetone to prevent precipitation of slightly soluble basic 20 salts.

The blend ratio of the anti-bacterial zeolite is not limited in particular. It is determined based on the product form of the deodorizing cosmetic. Usually, 0.1-90 mass %, preferably 1-70 mass %, more 25 preferably 5-70 mass % of the total amount of the

deodorizing cosmetic is blended in depending on the product form.

For the alum and/or dried alum used in the present invention, commercially available powder is 5 used. Examples of preferably used commercial products include Taiace S150, Taiace S100, Taiace K150, and Taiace K20 (TAIMEI Chemicals Co., Ltd.).

The blend ratio of the alum and/or dried alum is not limited in particular. It is determined based 10 on the product form of the skin treatment composition. Usually, 0.1-90 mass %, preferably 1-80 mass %, more preferably 5-70 mass % of the total amount of the skin treatment composition is blended in depending on the product form.

15 The alum and/or dried alum content is preferably 0.1 or more in terms of the mass ratio with the anti-bacterial zeolite content. When the product form is the aerosol spray type, it is preferable to have 0.1-80 mass % of the anti-bacterial zeolite and 20 0.1-80 mass % of the alum and/or dried alum, more preferably 0.5-70 mass % each. When the product form is the stick type, it is preferable to have 0.1-70 mass % of the anti-bacterial zeolite and 0.1-70 mass % of the alum and/or dried alum, more preferably 0.5-60 25 mass % each. When the product form is the powder type,

it is preferable to have 0.1-99.9 mass % of the anti-bacterial zeolite and 0.1-99.9 mass % of the alum and/or dried alum, more preferably 50-90 mass % each.

When the product form is the lotion type, it is preferable to have 0.1-30 mass % of the anti-bacterial zeolite and 0.1-30 mass % of the alum and/or dried alum, more preferably 0.5-20 mass % each.

The average particle size of said anti-bacterial zeolite is preferably 10 micrometers or less. More preferably it is 0.1-5 micrometers.

When the average particle size is in this range, it is preferable that 20% or less have a particle size larger than 1 micrometer in terms of the particle size distribution.

Said alum and/or dried alum is preferably fine particle powder having an average particle size of 0.01-50 micrometers.

In addition to the aforementioned essential ingredients, other ingredients commonly used in skin treatment compositions, for example one, two or more of those listed below, are blended as necessary into the skin treatment composition of the present invention; the preparation can be conducted for the target formulation with a conventional method.

Preferable products are antiperspirant cosmetics and

deodorizing cosmetics that are deodorizing skin treatment compositions.

The product form of the skin treatment composition of the present invention is not limited in particular. Examples include the spray type, roll-on type, powder type and pressed powder type, and stick type. The spray type is prepared by filling a spray container such as an aerosol can or dispenser with the ingredients as well as a propellant such as a liquefied gas and alcohol by using a conventional method. The roll-on type is prepared by filling a roll-on container with the ingredients and alcohol by using a conventional method. For the powder type and the pressed powder type, the ingredients are mixed together with powder components and oil components, and in the case of the powder type the mixture is used as is, and in the case of the pressed powder type the mixture is molded by various molding devices using a conventional method. The stick type is prepared by mixing the ingredients with oil components (solid oil and liquid oil) and filling a container with the mixture, followed by molding, using a conventional method.

25 [Invention of claims 7-8]

The anti-bacterial zeolite used in the present invention is zeolite that holds anti-bacterial metal ions in its ion-exchangeable parts.

i.e. zeolite whose exchangeable ions are partly 5 or entirely replaced by anti-bacterial metal ions.

In the present invention, zeolite having ammonium ion substitution in addition to anti-bacterial metal ion substitution is also preferable.

For the zeolite, either natural zeolite or 10 synthetic zeolite can be used. Zeolite is aluminosilicate having a three dimensional skeletal structure; it is represented by the general formula  $XM_{2/n}O \cdot Al_2O_3 \cdot YSiO_2 \cdot ZH_2O$ . In this general formula, M denotes an exchangeable ion, usually a monovalent or 15 divalent metal ion. n denotes the atomic valence of the (metal) ion. X and Y denote metal oxide and the silica factor, respectively, and Z denotes the number of the crystallization water molecules.

Specific examples of zeolite include A-type 20 zeolite, X-type zeolite, Y-zeolite, T-type, high silica zeolite, sodalite, mordenite, analcime, crinoptyrolite, chabasite, and erionite. The ion exchange capacity of these zeolites are: 7 meq/g for A-type zeolite, 6.4 meq/g for X-type zeolite, 5 meq/g 25 for Y-zeolite, 3.4 meq/g for T-type, 11.5 meq/g for

sodalite, 2.6 meq/g for mordenite, 5 meq/g for analcime, 2.6 meq/g for crinoptyrolite, 5 meq/g for chabasite, and 3.8 meq/g for erionite. Any of these has enough capacity for ion exchange with

5 anti-bacterial metal ions and/or ammonium ions.

Examples of exchangeable ions in zeolite include sodium ions, calcium ions, potassium ions, magnesium ions, and iron ions.

Examples of the anti-bacterial metal ions to substitute for these ions include silver, copper, zinc, mercury, tin, lead, bismuth, cadmium, chromium, and thallium ions; preferably silver, copper, or zinc ions, and more preferably silver ions.

The content of the anti-bacterial ions is preferably 0.1-15 mass % of the zeolite.

For example, anti-bacterial zeolite containing 0.1-15% of silver ion and 0.1-8 mass % of copper ion or zinc ion is preferable. On the other hand, zeolite can contain up to 20 mass % of ammonium ions; however, for the purpose of effectively preventing discoloration of the zeolite, 0.5-5% is preferable and 0.5-3 mass % is more preferable. "Mass %" means the mass percentage in 110°C dry standard zeolite.

In the present invention, commercial products can be used for the anti-bacterial zeolite; the

anti-bacterial zeolite can also be prepared by the following method, for example.

That is, zeolite is exposed to a mixed solution containing anti-bacterial metal ions such as silver 5 ions, copper ions, and zinc ions, prepared in advance, to substitute the aforementioned ions for the exchangeable ions in the zeolite.

The exposure can be achieved by the batch method or continuous method (column method, for example) for 10 3-24 hours, preferably 10-24 hours, at 10-70°C, preferably 40-60°C.

The pH of the aforementioned mixed solution should be adjusted to 3-10, preferably 5-7. This adjustment is preferable because precipitation of 15 silver oxide and such on the surface or in the pores of the zeolite can be prevented by this. Each ion in the mixed aqueous solution is usually supplied in the form of a salt. For example, silver ions are from silver nitrate, silver sulfate, silver perchlorate, 20 diamminesilver nitrate, diamminesilver sulfate, etc.; copper ions are from copper nitrate (II), copper perchlorate, copper acetate, potassium tetracyanocuprate, copper sulfate, etc.; zinc ions are from zinc nitrate (II), zinc sulfate, zinc 25 perchlorate, zinc thiocyanate, zinc acetate, etc.;

mercury ions are from mercury perchlorate, mercury nitrate, and mercury acetate; tin ions are from tin sulfate and such; lead ions are from lead sulfate, lead nitrate, etc.; bismuth ions are from bismuth chloride, bismuth iodide, etc.; cadmium ions are from cadmium perchlorate, cadmium sulfate, cadmium nitrate, and cadmium acetate; chromium ions are from chromium perchlorate, chromium sulfate, chromium ammonium sulfate, chromium nitrate, etc.; thallium ions are from thallium perchlorate, thallium sulfate, thallium nitrate, thallium acetate, etc.

The anti-bacterial metal ion content in the zeolite can be controlled by adjusting the concentration of each ion (salt) in said mixed aqueous solution.

For example, in the case of anti-bacterial zeolite containing silver ions, an anti-bacterial zeolite with a silver ion content of 0.1-5% can be obtained by adjusting the silver ion concentration in said mixed aqueous solution to 0.002M/l-0.15M/l.

In the case of anti-bacterial zeolite additionally containing copper ions and zinc ions, an anti-bacterial zeolite with a copper ion content of 0.1-8% and a zinc ion content of 0.1-8% can be obtained by adjusting the silver ion concentration to

0.1M/l-0.85M/l and the zinc ion concentration to 0.15M/l-1.2M/l in said mixed aqueous solution.

For ion exchange of anti-bacterial zeolite, it is also possible to use solutions, each of which 5 contains each ion, and expose the zeolite with these solutions one after another. The concentration of each ion in each aqueous solution can be determined based on the concentration of each ion in said mixed aqueous solution.

10 After the completion of the ion exchange, the zeolite is thoroughly rinsed and then dried. The drying is preferably done at 105°C-115°C, or under a reduced pressure (1-30 Torr) at 70-90°C.

15 Ion exchange for organic ions and/or for ions for which there isn't an adequate water soluble salt, such as tin and bismuth, can be done by using an organic solvent solution such as an alcohol or acetone to prevent precipitation of slightly soluble basic salts.

20 The blend ratio of the anti-bacterial zeolite in the skin treatment composition is not limited in particular. It is determined based on the reason why the anti-bacterial zeolite is added and also on the product form of the skin treatment composition.

25 For example, when blended in as a preservative,

the blend ratio is usually 0.05-10 mass % of the total amount of the skin treatment composition.

As another example, when blended in as a bactericide, the blend ratio is usually 0.1-90 mass % of the total amount of the skin treatment composition, depending on the product form.

For example, for lotion or cream type skin treatment compositions 0.1-20 mass % of the total amount of the skin treatment composition is preferable; for powder type skin treatment compositions 0.5-80 mass % of the total amount of the skin treatment composition is preferable; for stick type skin treatment compositions 0.5-60 mass % of the total amount of the skin treatment composition is preferable; and for spray type skin treatment compositions 0.5-50 mass % of the total amount of the skin treatment composition is preferable.

Polyoxyethylene polyoxypropylene 2-decyltetradecyl ether used in the present invention is a prior art ingredient of skin treatment compositions as a surfactant. It is usually blended into lotion as a solubilizing agent.

In the present invention, polyoxyethylene polyoxypropylene 2-decyltetradecyl ether (20-28 E.O.) (10-16 P.O.) is preferable; it specifically

acts as an anti-staining agent for skin treatment compositions containing anti-bacterial zeolite.

Other surfactants known as solubilizing agents for perfume, such as polyoxyethylene (E.O. 60) hydrogenated castor oil, do not have an anti-staining effect for skin treatment compositions.

The blend ratio of the polyoxyethylene polyoxypropylene 2-decyltetradecyl ether (20-28 E.O.) (10-16 P.O.) is determined based on the blend ratio of the anti-bacterial zeolite and the product form. It is usually 0.01-5 mass % of the total amount of the skin treatment composition.

When using the skin treatment composition of the present invention for applications such as odor eliminating agents and antiperspirant cosmetics, it is preferable to blend in an aluminum compound that is an antiperspirant.

In addition to the aforementioned essential ingredients, other ingredients commonly used in skin treatment compositions, for example one, two or more of those listed below, are blended as necessary in the skin treatment composition of the present invention; the preparation can be conducted for the target formulation with a conventional method.

[Ingredients that can be blended in the present invention]

Examples of the powder ingredients include inorganic powders (for example, talc, kaolin, mica, 5 sericite, muscovite, phlogopite, synthetic mica, lepidolite, biotite, vermiculite, magnesium carbonate, calcium carbonate, aluminum silicate, barium silicate, calcium silicate, magnesium silicate, strontium silicate, tungstic acid metal 10 salt, magnesium, silica, barium sulfate, firing calcium sulfate (calcined gypsum), calcium phosphate, fluorineapatite, hydroxy apatite, ceramic powder, metallic soaps (for example, zinc myristate, calcium palmitate, and aluminum stearate), and boron 15 nitride); organic powders (for example, polyamide resin powder (nylon powder), polyethylene powder, poly methyl methacrylate powder, benzoguanamine resin powder, polytetrafluoroethylene powder, and cellulose powder); inorganic white pigments (for 20 example, titanium dioxide and zinc oxide); inorganic red pigments (for example, iron oxide (red iron oxide) and iron titanate); inorganic brown pigments (for example,  $\gamma$ -iron oxide); inorganic yellow pigments (for example, yellow iron oxide and loess); inorganic 25 black pigments (for example, black iron oxide and low

oxides of titanium); inorganic purple pigments (for example, manganese violet, cobalt violet); inorganic green pigments (for example, chromium oxide, chromium hydroxide, and cobalt titanate); inorganic blue  
5 pigments (for example, ultramarine blue and Berlin blue); pearl pigment (for example, titania coated mica, titania coated bismuth oxychloride, titania coated talc, coloration titania coated mica, bismuth oxychloride, fish scale flakes); metal powder  
10 pigments (for example, aluminum powder, copper powder); organic pigments such as Zr, barium or aluminum rake (for example, organic pigments such as red 201, red 202, red 204, red 205, red 220, red 226, red 228, red 405, orange 203, orange 204, yellow 205, yellow 401 and blue 404, as well as red 3, red 104, red 106, red 227, red 230, red 401, red 505, orange 205, yellow 4, yellow 5, yellow 202, yellow 203, green 3 and blue 1; and natural colors (for example, chlorophyll and  $\beta$ -carotene).  
15  
20

Examples of the liquid fats and oils include avocado oil, tsubaki oil, turtle fatty acid, macadamia nut oil, corn oil, mink oil, olive oil, rapeseed oil, egg yolk oil, sesame oil, persic oil, wheat germ oil, sasanqua oil, castor oil, linseed oil, safflower oil, cotton seed oil, perilla oil, soybean  
25

oil, peanut oil, tea seed oil, Japanese nutmeg oil, rice bran oil, Chinese gimlet oil, Japan gimlet oil, jojoba oil, germ oil, and triglycerin.

Examples of the solid fats and oils include  
5 cacao butter, coconut oil, hydrogenated coconut oil, palm oil, palm kernel oil, Japanese core wax nucleus oil, hydrogenated oil, Japanese core wax, and hydrogenated castor oil.

Examples of the waxes include beeswax,  
10 candelilla wax, cotton wax, carnauba wax, bayberry wax, tree wax, whale wax, montan wax, bran wax, lanolin, kapok wax, lanolin acetate, liquid lanolin, sugar cane wax, lanolin fatty acid isopropyl ester, hexyl laurate, reduced lanolin, jojoba wax, hard  
15 lanolin, shellac wax, POE lanolin alcohol ether, POE lanolin alcohol acetate, POE cholesterol ether, lanolin fatty acid polyethylene glycol, POE hydrogenated lanolin ethyl alcohol ether, ceresin, and microcrystalline wax.

20 Examples of the hydrocarbon oils include liquid petrolatum, ozocerite, squalane, pristane, paraffin, squalene, and petrolatum.

Examples of the higher fatty acids include  
lauric acid, myristic acid, palmitic acid, stearic  
25 acid, behenic acid, oleic acid, undecylenic acid,

isostearic acid, linolic acid, linoleic acid, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA).

Examples of the higher alcohols include  
5 straight chain alcohols (for example, lauryl alcohol, cetyl alcohol, stearyl alcohol, behenyl alcohol, myristyl alcohol, oleyl alcohol, and cetostearyl alcohol) and branched chain ethyl alcohols (for example, mono stearyl glycerin ether (batyl alcohol),  
10 2-decyltetradecynol, lanolin alcohol, cholesterol, phytosterol, hexyl dodecanol, iso stearyl alcohol, and octyl dodecanol).

Examples of the ester oils include isopropyl myristate, cetyl octanoate, octyl dodecyl myristate,  
15 isopropyl palmitate, butyl stearate, hexyl laurate, myristil myristate, decyl oleate, dimethyl hexyl decyl octanoate, cetyl lactate, myristil lactate, lanolin acetate, iso cetyl stearate, iso cetyl isostearate, cholesteryl hydroxy 12-stearate,  
20 di-2-ethylene glycol ethylhexanoate, dipentaerythritol fatty acid ester, n-alkylene glycol monoisostearate, neopentyl glycol dicaprate, diisostearyl malate, glyceryl di-2-heptylundecanoate, trimethylolpropane  
25 tri-2-ethylhexanoate, trimethylolpropane

triisostearate, tetra-2-pentaerythritol ethylhexanoate, glycerin tri-2-ethylhexanoate, glyceryl trioctanoate, glycerin triisopalmitate, trimethylolpropane triisostearate, cetyl 2-ethyl 5 hexanoate, 2-ethylhexyl palmitate, glycerin trimyristate, tri-2-heptyl undecanoic acid glyceride, methyl castor oil fatty acid, oleyl oleate, aceto glyceride, 2-heptyl undecyl palmitate, diisobutyl adipate, 2-octyldodecyl N-lauroyl-L-glutamate, 10 di-2-heptyl undecyl adipate, ethyl laurate, di-2-ethylhexyl sebacate, 2-hexyl decyl myristate, 2-hexyl decyl palmitate, 2-hexyl decyl adipate, diisopropyl sebacate, 2-ethylhexyl succinate, and triethyl citrate.

15 Examples of the silicone oils include chain polysiloxanes (for example, dimethylpolysiloxane, methylphenyl polysiloxane, and diphenyl polysiloxane); ring polysiloxanes (for example, octamethylcyclotetrasiloxane, decamethyl cyclopenta siloxane, and dodecamethyl cyclohexa siloxane), 20 silicone resins forming a three-dimensional network structure, silicone rubbers, and various modified polysiloxanes (amino-modified polysiloxane, polyether-modified polysiloxane, alkyl-modified polysiloxane, and fluorine-modified polysiloxane).

Examples of the anionic surfactants include fatty acid soaps (for example, sodium laurate and sodium palmitate); higher alkyl sulfuric ester salts (for example, sodium lauryl sulfate and potassium 5 laurylsulfate); alkylether sulfuric ester salts (for example, POE-triethanolamine laurylsulfate and sodium POE-lauryl sulfate); N-acyl sarcosinic acids (for example, sodium N-lauroyl sarcosinate); higher fatty acid ester sulfates (for example, hydrogenated 10 coconut oil aliphatic acid glycerin sodium sulfate); N-acyl glutamates (for example, mono sodium N-lauroylglutamate, disodium N-stearoylglutamate, and sodium N-myristoyl-L-glutamate); sulfated oils (for example, turkey red oil); POE-alkylether 15 carboxylic acid; POE-alkylarylether carboxylate;  $\alpha$ -olefin sulfonate; higher fatty acid ester sulfonates; sec-alcohol sulfates; higher fatty acid alkyl amide sulfates; sodium lauroyl monoethanolamine succinates; ditriethanolamine 20 N-palmitoylaspartate; and sodium caseinate.

Examples of the cationic surfactants include alkyltrimethylammonium salts (for example, stearyltrimethyl ammonium chloride and lauryltrimethyl ammonium chloride) alkylpyridinium 25 salts (for example, cetylpyridinium chloride),

distearyldimethylammonium chloride  
dialkyldimethylammonium salt; poly  
(N,N'-dimethyl-3,5-methylene piperidinium)  
chloride; alkyl quaternary ammonium salts; alkyl  
5 dimethylbenzyl ammonium salts; alkyl isoquinolinium  
salts; dialkylmorpholine salts; POE alkyl amines;  
alkyl amine salts; polyamine fatty acid derivatives;  
amylalcohol fatty acid derivatives; benzalkonium  
chloride; and benzethonium chloride.

10 Examples of the amphotytic surfactants include:  
imidazoline type amphotytic surfactants (for example,  
2-undecyl-N, N, N-(hydroxyethyl  
carboxymethyl)-2-imidazoline sodium salt and 2-coco  
y1-2-imidazolinium hydroxide-1-carboxyethoxy 2  
15 sodium salt); and betaine type surfactants (for  
example,  
2-heptadecyl-n-carboxymethyl-n-hydroxyethyl  
imidazolinium betaine, lauryldimethylaminoacetic  
acid betaine, alkyl betaine, amide betaine, and  
20 sulfobetaine).

Examples of the lipophilic nonionic surfactant  
include sorbitan fatty acid esters (for example,  
sorbitan mono oleate, sorbitan mono isostearate,  
sorbitan mono laurate, sorbitan mono palmitate,  
25 sorbitan mono stearate, sorbitan sesqui oleate,

sorbitan trioleate, diglycerol sorbitan penta-2-ethylhexylate, and diglycerol sorbitan tetra-2-ethylhexylate); glycerin polyglycerin aliphatic acids (for example, mono-cottonseed oil 5 fatty acid glycerin, glycetyl monoerucate, glycerin sesquioleate, glycetyl monostearate,  $\alpha$ ,  $\alpha$ '-glyceryl oleate pyroglutamate, and glycetyl mono stearate mono malate); propylene glycol fatty acid esters (for example, propylene glycol monostearate); 10 hydrogenated castor oil derivatives; and glycerin alkylethers.

Examples of the hydrophilic nonionic surfactant include: POE-sorbitan fatty acid esters (for example, POE-sorbitan monooleate, POE-sorbitan monostearate, 15 POE-sorbitan monoolate, and POE-sorbitan tetraoleate); POE sorbitol fatty acid esters (for example, POE sorbitol monolaurate, POE-sorbitol monooleate, POE-sorbitolpentaooleate, and POE-sorbitol monostearate); POE-glycerin fatty acid esters (for example, POE-monooleates such as 20 POE-glycerin monostearate, POE-glycerin monoisostearate, and POE-glycerin triisostearate); POE-fatty acid esters (for example, POE-distearate, POE-monodioleate, and ethylene glycol distearate); 25 POE-alkylethers (for example, POE-lauryl ether,

POE-oleyl ether, POE-stearyl ether, POE-behenyl ether, POE-2-octyl dodecyl ether, and POE-cholestanol ether); POE/POP-alkylethers (for example, POE/POP-cetyl ether, POE/POP-2-decyl 5 tetradecyl ether, POE/POP-monobutyl ether, POE/POP-lanolin hydrate, and POE/POP-glycerin ether); POE-castor oil hydrogenated castor oil derivatives (for example, POE-castor oil, POE-hydrogenated castor oil, POE-hydrogenated castor 10 oil monoisostearate, POE-hydrogenated castor oil triisostearate, POE-hydrogenated castor oil monopyroglutamic monoisostearic diester, and POE-hydrogenated castor oil maleic acid); POE-beeswax/lanolin derivatives (for example, 15 POE-sorbitol beeswax); alkanol amides (for example, coconut fatty acid diethanol amide, lauric acid monoethanol amide, and aliphatic acid isopropanol amide); POE-propylene glycol fatty acid esters; POE-alkyl amines; POE-fatty acid amides; sucrose 20 fatty acid esters; alkyl ethoxy dimethylamine oxides; and trioleyl phosphoric acid.

Examples of the humectant include polyethylene glycol, propylene glycol, glycerin, 1,3-butylene glycol, xylitol, sorbitol, maltitol, chondroitin 25 sulfate, hyaluronic acid, mucosin sulfuric acid,

charonic acid, atelocollagen,  
cholesteryl-12-hydroxy stearate, sodium lactate,  
bile salt, dl-pyrrolidone carboxylic acid salt, short  
chain soluble collagen, diglycerin (EO)PO adduct,  
5 chestnut rose fruit extract, yarrow extract, and  
sweet clover extract.

Examples of the natural water-soluble polymer include: plant-type polymers {for example, gum arabic, gum tragacanth, galactan, guar gum, carob gum, karaya 10 gum, carrageenan, pectin, agar, quince seed (*Cydonia oblonga*), algae colloids (brown algae extract), starches (rice, corn, potato, and wheat), and glycyrrhizic acid}; microorganism-type polymers (for example, xanthan gum, dextran, succinoglucan, and 15 pullulan); and others (for example, fish-derived collagen, fish-derived gelatin, wheat protein, and silk protein).

Examples of the semisynthetic water-soluble polymers include: starch-type polymers (for example, 20 carboxymethyl starch and methylhydroxypropyl starch); cellulosic polymers (for example, methyl cellulose, ethyl cellulose, methylhydroxypropyl cellulose, hydroxyethyl cellulose, cellulose sodium sulfate, hydroxypropyl cellulose, 25 carboxymethyl-cellulose, sodium carboxymethyl

cellulose, crystal cellulose, and cellulose powder); and alginic acid-type polymers (for example, sodium alginate and propyleneglycol alginate).

Examples of the synthetic water-soluble  
5 polymers include: vinyl polymers (for example, polyvinyl alcohol, polyvinyl methyl ether, polyvinylpyrrolidone, and carboxy vinyl polymer); polyoxyethylene-type polymers (for example, a copolymer of polyethylene glycol 20,000, 40,000, or  
10 60,000 and polyoxyethylene polyoxypropylene); acrylic polymers (for example, sodium polyacrylate, polyethylacrylate, and polyacrylamide); polyethyleneimine; and cationic polymers.

Examples of the thickeners include: gum arabic,  
15 carrageenan, karaya gum, gum tragacanth, carob gum, quince seed (*Cydonia oblonga*), casein, dextrin, gelatin, sodium pectate, sodium arginate, methyl cellulose, ethyl cellulose, CMC, hydroxy ethyl cellulose, hydroxypropyl cellulose, PVA, PVM, PVP,  
20 sodium polyacrylate, carboxy vinyl polymer, locust bean gum, guar gum, tamarind gum, cellulose dialkyl dimethylammonium sulfate, xanthan gum, aluminum magnesium silicate, bentonite, hectorite, AlMg silicate (beagum), laponite, and silicic acid  
25 anhydride.

Examples of the ultraviolet absorbents include the following compounds.

(1) Benzoic acid-type ultraviolet absorbents

For example, p-aminobenzoic acid (hereafter abbreviated as PABA), PABA monoglycerin ester, N, N-dipropoxy PABA ethyl ester, N, N-diethoxy PABA ethyl ester, N,N-dimethyl PABA ethyl ester, N, N-dimethyl PABA butyl ester, and N,N-dimethyl PABA ethyl ester.

10 (2) Anthranilic acid-type ultraviolet absorbents

For example, homo mentyl-N-acetyl anthranilate.

(3) Salicylic acid-type ultraviolet absorbents

For example, amyl salicylate, mentyl salicylate, homo mentyl salicylate, octyl salicylate, phenyl salicylate, benzyl salicylate, and p-isopropanol phenyl salicylate.

(4) Cinnamic acid-type ultraviolet absorbents

For example, octyl cinnamate, ethyl-4-isopropyl cinnamate, methyl-2 ,5-diisopropyl cinnamate, ethyl-2 ,4-diisopropyl cinnamate, methyl-2 ,4-diisopropyl cinnamate, propyl-p-methoxy cinnamate, isopropyl-p-methoxy cinnamate, isoamyl-p-methoxy cinnamate, octyl-p-methoxy

cinnamate (2-ethylhexyl-p-methoxy cinnamate),  
2-ethoxyethyl-p-methoxy cinnamate,  
cyclohexyl-p-methoxy cinnamate, ethyl- $\alpha$ -cyano- $\beta$ -phenyl  
5 cinnamate, and glyceryl mono-2-ethyl  
hexanoyl-di-p-methoxy cinnamate.

(5) Triazine-type ultraviolet absorbents

For example, bisresorsinyl triazine.

More specifically,

10 bis{[4-(2-ethylhexyloxy)-2-hydroxy]phenyl}-6-(4-methoxyphenyl)1,3,5-triazine,  
2,4,6-tris{4-(20ethylhexyloxycarbonyl)anilino}1,3,  
5-triazine, etc.

(6) Other ultraviolet absorbents

15 For example, 3-(4'-methylbenzylidene)-d,1-camphor, 3-benzylidene-d,1-camphor,  
2-phenyl-5-methyl benzoxazol, 2-(2'-hydroxy-5'-methylphenyl) benzotriazol,  
2-(2'-hydroxy-5'-t-octylphenyl) benzotriazol,  
20 2-(2'-hydroxy-5'-methylphenyl benzotriazol,  
dibenzaladine, dianisoylmethane, and  
4-methoxy-4'-t-butyl dibenzoyl-methane,  
5-(3,3-dimethyl-2-norbornylidene)-3-pentane-2-one.  
Pyridazinone derivatives such as dimorpholino  
25 pyridazine.

Examples of the sequestering agents include:

1-hydroxy ethane-1,1-diphosphonic acid, 1-hydroxy ethane-1,1-diphosphonic acid tetrasodium salt, disodium edetate, trisodium edetate, tetrasodium

5 edetate, sodium citrate, sodium polyphosphate, sodium metaphosphate, gluconic acid, phosphoric acid, citric acid, ascorbic acid, and succinic acid.

Examples of the lower alcohols include ethanol,

propanol, isopropanol, isobutanol, and t-butyl

10 alcohol.

Examples of the polyhydric alcohols include:

dihydric alcohols (for example, ethylene glycol,

propylene glycol, trimethylene glycol, 1,2-butylene glycol, 1,3-butylene glycol, tetramethylene glycol,

15 2,3-butylene glycol, pentamethylene glycol,

2-butene-1,4-diol, hexylene glycol, and octylene

glycol); trihydric alcohols (for example, glycerin and trimethylolpropane); tetrahydric alcohols (for example, pentaerythritol such as 1,2,6-hexanetriol);

20 pentahydric alcohols (for example, xylitol);

hexahydric alcohols (for example, sorbitol,

mannitol); polyhydric alcohol polymers (for example,

diethylene glycol, dipropylene glycol, triethylene glycol, polypropylene glycol, tetraethylene glycol,

25 diglycerin, polyethylene glycol, triglycerin,

tetraglycerin, and polyglycerin); dihydric alcohol alkylethers (for example, ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, ethylene glycol monobutyl ether, ethylene glycol monophenyl ether, ethylene glycol monohexyl ether, ethylene glycol mono 2-methyl hexyl ether, ethylene glycol isoamyl ether, ethylene glycol benzyl ether, ethylene glycol isopropyl ether, ethylene glycol dimethylether, ethylene glycol diethyl ether, and 10 ethylene glycol dibutyl ether); dihydric alcohol ether esters (for example, ethylene glycol monomethyl ether acetate, ethylene glycol monoethyl ether acetate, ethylene glycol monobutyl ether acetate, ethylene glycol monophenyl ether acetate, ethylene glycol diadipate, ethylene glycol disuccinate, 15 diethylene glycol monoethyl ether acetate, diethylene glycol monobutyl ether acetate, propylene glycolmonomethyl ether acetate, propylene glycol monoethyl ether acetate, propylene glycol monopropyl ether acetate, and propylene glycol monophenyl ether acetate); glycerin mono alkyl ethers (for example, xylol alcohol, selachyl alcohol, and batyl alcohol); sugar alcohols (for example, sorbitol, maltitol, maltotriose, mannitol, sucrose, erythritol, glucose, 20 fructose, starch amylolysis sugar, maltose, xylitose, 25

and alcohol prepared by the reduction of starch  
amylolysis sugar); glysolid; tetrahydro furfuryl  
alcohol; POE-tetrahydro furfuryl alcohol; POP-butyl  
ether; POP·POE-butyl ether; tripolyoxypropylene  
5 glycerin ether; POP-glycerin ether, POP-glycerin  
ether phosphoric acid; POP/POE-pentane erythritol  
ether, and polyglycerin.

Examples of the monosaccharides include:  
triose (for example, D-glyceryl aldehyde and  
10 dihydroxyacetone); tetroses (for example,  
D-etythrose, D-erythrulose, D-threose, and  
erythritol); pentoses (for example, L-arabinose,  
D-xylose, L-lyxose, D-arabinose, D-ribose,  
D-ribulose, D-xylulose, and L-xylulose); hexoses  
15 (for example, D-glucose, D-talose, D-psicose,  
D-galactose, D-fructose, L-galactose, L-mannose, and  
D-tagatose); heptoses (for example, aldoheptose and  
heprose); octoses (for example, octurose);  
deoxysugars (for example, 2-deoxy-D-ribose,  
20 6-deoxy-L-galactose, and 6-deoxy-L-mannose); amino  
sugars (for example, D-glucosamine, D-galactosamine,  
sialic acid, amino uronic acid, and muramic acid); and  
uronic acid (for example, D-glucuronic acid,  
D-mannuronic acid, L-guluronic acid, D-galacturonic  
25 acid, and L-iduronic acid).

Examples of the oligosaccharides include sucrose, umbelliferoose, lactose, planteose, isolignoses,  $\alpha$ ,  $\alpha$ -trehalose, raffinose, lignoses, umbilicine, stachyose and verbascose.

5 Examples of the polysaccharides include cellulose, quince seed, chondroitin sulfate, starch, galactan, dermatan sulfate, glycogen, gum arabic, heparan sulfate, hyaluronic acid, traganth gum, keratan sulfate, chondroitin, xanthan gum, mucoitin  
10 sulfuric acid, guar gum, dextran, kerato sulfate, locustbean gum, succinoglucane, and charonic acid.

Examples of the amino acids include neutral amino acids (for example, threonine and cysteine) and basic amino acids (for example, hydroxylysine).

15 Examples of the amino acid derivatives include sodium acyl sarcosinate (sodium N-lauroyl sarcosinate), acyl glutamate, acyl  $\beta$ -alanine sodium, glutathione, and pyrrolidone carboxylic acid.

Examples of the organic amines include  
20 monoethanolamine, diethanolamine, triethanolamine, morpholine, triisopropanolamine, 2-amino-2-carbonyl-1,3-propanediol, and 2-amino-2-carbonyl-1-propanol.

Examples of the high polymer emulsions include  
25 acrylic resin emulsions, ethyl polyacrylate

emulsions, acryl resin liquids, polyacrylic alkyl ester emulsions, polyvinyl acetate resin emulsions, and natural rubber latex.

Examples of the pH adjustment agents include  
5 buffers such as lactic acid-sodium lactate, citric acid-sodium citrate, and succinic acid-sodium succinate.

Examples of the vitamins include vitamins A, B1,  
B2, B6, C and E as well as their derivatives,  
10 pantothenic acid and its derivatives, and biotin.

Examples of the antioxidants include tocopherols, dibutyl hydroxytoluene, butyl hydroxyanisole, and gallic ester.

Examples of the antioxidation auxiliary agents  
15 include phosphoric acid, citric acid, ascorbic acid, maleic acid, malonic acid, succinic acid, fumaric acid, cephalin, hexameta phosphate, phytic acid, and ethylene diamine tetraacetic acid.

Examples of other possible ingredients include  
20 antiseptics (methylparaben, ethylparaben, butylparaben, and phenoxyethanol); anti-inflammatory agents (for example, glycyrrhizic acid derivatives, glycyrrhetic acid derivatives, salicylic acid derivatives, hinokitiol, zinc oxide,  
25 and allantoin); whitening agents (for example,

creeping saxifrage extract, arbutin, tranexamic acid,  
L-ascorbic acid, magnesium L-ascorbyl phosphate,  
L-ascorbic acid glucoside, and potassium  
4-methoxysalicylate); various extracts (for  
5 example, Phellodendri Cortex, goldthread,  
lithospermum root, Paeonia lactiflora, Swertia  
japonica, Birch, sage, loquat, carrot, aloe, Malva  
sylvestris, Iris, grape, Coix ma-yuen, sponge gourd,  
lily, saffron, Cnidium officinale, sheng jiang,  
10 Hypericum erectum, Ononis, garlic, Guinea pepper,  
chen pi, Ligusticum acutilobum, and seaweed),  
activators (royal jelly, photosensitizer, and  
cholesterol derivatives); blood circulation  
promoting agents (for example, nonyl acid valenyl  
15 amide, nicotinic acid benzyl esters, nicotinic acid  
 $\beta$ -butoxy ethyl esters, capsaicin, gingeron,  
cantharis tincture, Ichthammol, tannic acid,  $\alpha$   
-borneol, tocopherol nicotinate, inositol  
hexanicotinate, cyclandelate, cinnarizine,  
20 tolazoline, acetylcholine, verapamil, cepharanthine,  
and  $\beta$ -orizanol); anti-seborrhea agents (for example,  
sulfur and thiantol); and antiinflammatory agents  
(for example, thiotaурine and hypotaурine); and  
bactericides (for example, benzoic acid and its salts,  
25 isopropylmethyl phenol, undecylenic acid and its

salts, undecylenic acid monoethanol amide,  
cetyltrimethyl ammonium chloride, cetylpyridinium  
chloride, benzalkonium chloride, benzethonium  
chloride, alkyldiaminoethylglycine chloride,  
5 chlorhexidine chloride, orthophenyl phenol,  
chlorhexidine gluconate, cresol, chloramine T,  
chlorxylenol, chlorcresol, chlorfenesin,  
chlorobutanol,  
5-chloro-2-methyl-4-isothiazoline-3-one, salicylic  
10 acid and its salts,  
1,3-dimethylol-5,5-dimethylhidantoin,  
alkylisoquinolium bromide, domiphen bromide and its  
salt, sorbic acid and its salts, thymol, thylum,  
thiram, dehydroacetic acid and its salt, triclosan,  
15 trichlorocarbanilide, p-oxybenzoic ester,  
p-chlorphenol, halocarban, pyrogallol, phenol,  
hexachlorophene, 2-methyl-4-isothiazoline-3-one,  
NN"-Methylenebis(N'-(3-hydroxymethyl-2,5-dioxo-4-i  
midazolidinyl)urea), sodium layroylsarcosine, and  
20 resorcin).

#### EXAMPLES

The present invention is described in detail  
below by referring to Examples. The present  
25 invention is not limited to these examples. The

blend ratios are in mass-percentage units unless specified otherwise.

[Invention of claim 1]

5        Recipes shown in Table 1-1 and Table 1-2 were used to prepare powder lotion-type antiperspirant lotions and the degree of discoloration was evaluated visually. For Comparative examples, a recipe containing no trisodium ethylenediaminehydroxyethyl  
10      triacetate and a recipe containing a chelating agent EDTA-3Na·2H<sub>2</sub>O instead of trisodium ethylenediaminehydroxyethyl triacetate were investigated. The degree of discoloration was evaluated by giving O to those that are within the  
15      acceptable range for skin treatment composition, and X to those that are outside of this range.

Table 1-1

	Examples			Comparative examples							
	1-1	1-2	1-3	1-1	1-2	1-3	1-4	1-5	1-6	1-7	
Ion-exchanged water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	
Ethanol (95%, synthesized)	50	50	50	50	50	50	50	50	50	50	50
Chlorhydroxy aluminum 50% aqueous solution (Antiperspirant)	20	20	20	20	20	20	20	20	20	20	20
POE (10) POP (20) decyltetradecyl ether (dispersing agent)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Anti-bacterial zeolite A (preservative)	1	1	1	1	1	1	1	1	1	1	1
Trisodium ethylenediaminehydroxyethyl triacetate	0.1	0.05	0.01								
EDTA-3Na·2H <sub>2</sub> O				0.3	0.2	0.1	0.08	0.05	0.03		
Total	100	100	100	100	100	100	100	100	100	100	
Solution color	Light red	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	Transparent	
Precipitation color	○	○	○	×	×	×	×	×	×	×	
Degree of discoloration (visual evaluation)	○	○	○	Gray/purple	Gray/purple	Gray/purple	Gray/purple	Gray/purple	Gray/purple	Gray/purple	

Anti-bacterial zeolite A: Zeolite containing silver ions and zinc ions (average particle size approximately 1.5 micrometers)

Table 1-2

	Examples			Comparative examples								
	1-4	1-5	1-6	1-8	1-9	1-10	1-11	1-12	1-13	1-14		
Ion-exchanged water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
Ethanol (95%, synthesized)	50	50	50	50	50	50	50	50	50	50	50	50
Chlorhydroxy aluminum 50% aqueous solution (Antiperspirant)	20	20	20	20	20	20	20	20	20	20	20	20
POE (10) POP (20) decyltetradecyl ether (dispersing agent)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Anti-bacterial zeolite B (preservative)	1	1	1	1	1	1	1	1	1	1	1	1
Trisodium ethylenediaminehydroxyethyl triacetate	0.1	0.05	0.01									
EDTA-3Na·2H <sub>2</sub> O					0.3	0.2	0.1	0.08	0.05	0.03		
Total	100	100	100	100	100	100	100	100	100	100	100	100
Solution color	Light red	Transparent	Light red	Transparent	Light red	Transparent	Gray/purple	Transparent	Gray/purple	Transparent	Gray/purple	Transparent
Precipitation color	O	Light red	O	Light red	O	Gray/purple	X	Gray/purple	X	Gray/purple	X	Gray/purple
Degree of discoloration (visual evaluation)	O	O	O	X	X	X	X	X	X	X	X	X

Anti-bacterial zeolite B: Zeolite containing silver ions, zinc ions, and ammonium ions (Zeomic AJ10N from Sinanen Zeomic Co., Ltd., average particle size 5 approximately 1.5 micrometers)

The aforementioned results show that Comparative examples that do not contain trisodium ethylenediaminehydroxyethyl triacetate and Comparative examples that contain a chelating agent 5 EDTA-3Na·2H<sub>2</sub>O exhibit discoloration of precipitated white powder of anti-bacterial silver zeolite into gray/purple, resulting in a larger degree of discoloration.

On the other hand, Examples containing 10 trisodium ethylenediaminehydroxyethyl triacetate exhibit only slight red discoloration of the precipitated anti-bacterial silver zeolite; and the degree of discoloration is very small and within the allowable range for skin treatment compositions; 15 which indicates a superior antidiscoloration effect.

Other Examples of the present invention are shown below.

Example 1-7: Pressed powder

20	Chlorhydroxy aluminum	5 mass %
	Zinc oxide (zinc flower)	5
	Talc	76.99
	Liquid petrolatum	3
	Anti-bacterial zeolite B	10
25	Trisodium ethylenediaminehydroxyethyl triacetate	

0.01

Example 1-8: Loose powder

	Chlorhydroxy aluminum	5 mass %
5	Zinc oxide (zinc flower)	5
	Talc	79.99
	Anti-bacterial zeolite B	10
	Trisodium ethylenediaminehydroxyethyl triacetate	0.01

10

Example 1-9: Lotion-type spray

(Stock solution recipe)

	Purified water	10 mass %
	Chlorhydroxy aluminum	10
15	Anhydrous ethyl alcohol	73.9
	Isopropyl myristate	2
	1,3-butylene glycol	3
	Anti-bacterial zeolite B	1
	Trisodium ethylenediaminehydroxyethyl triacetate	0.1
20	(Filler recipe)	
	Stock solution	50
	LPG	50

25 Example 1-10: Powder spray

	Chlorhydroxy aluminum	20 mass %
	Silicic acid anhydride	15
	Talc	20.21
	Zinc oxide (zinc flower)	5
5	Isopropyl myristate	21.79
	Dimethyl polysiloxane	10
	Sorbitan fatty acid ester	3
	Anti-bacterial zeolite B	5
	Trisodium ethylenediaminehydroxyethyl triacetate	
10		0.1
	(Filler recipe)	
	Stock solution	10
	LPG	90

15	Example 1-11: Powder spray	
	Chlorhydroxy aluminum	20 mass %
	Silicic acid anhydride	15
	Talc	20.21
	Zinc oxide (zinc flower)	5
20	Isopropyl myristate	21.79
	Polyoxyethylene/polyoxypropylene random polymer	
	methyl ether	10
	Sorbitan fatty acid ester	3
	Anti-bacterial zeolite B	5
25	Trisodium ethylenediaminehydroxyethyl triacetate	

0.1

(Filler recipe)

Stock solution 10

LPG 90

5

Example 1-12: Stick

Chlorhydroxy aluminum 20 mass %

Talc 7.9

Zinc oxide (zinc flower) 5

10 Solid petrolatum wax 2

Stearyl alcohol 8

Liquid petrolatum 15

Cyclic dimethyl polysiloxane 36

Sorbitan fatty acid ester 1

15 Anti-bacterial zeolite B 5

Trisodium ethylenediaminehydroxyethyl triacetate

0.1

Example 1-13: Cream

20 Purified water 45 mass %

Squalane 20

Cyclic dimethyl polysiloxane 15

Glyceryl diisostearate 3

Diethoxyethyl succinate 5

25 Organically modified montmorillonite 1.5

1, 3-butylene glycol	5.49
Anti-bacterial zeolite A	5
Trisodium ethylenediaminehydroxyethyl triacetate	
	0.01

5

Example 1-14: Emulsion

Purified water	20 mass %
Chlorhydroxy aluminum	20
Octyl-p-methoxycinnamate	5
10 Oxybenzone	3
4-tert butyl-4'-methoxybenzoylmethane	1
Hydrophobically treated zinc oxide	5
Polyoxyethylene/polypropylene random polymer methyl ether	10
15 Silicone oil	15
Silicone resin	1
Glyceryl diisostearate	1
Organically modified montmorillonite	0.5
1, 3-butylene glycol	5.49
20 Anti-bacterial zeolite B	13
Trisodium ethylenediaminehydroxyethyl triacetate	
	0.01

Example 1-15: Ointment

25 Purified water	53.74 mass %
-------------------	--------------

	Chlorhydroxy aluminum	20
	Glycerin	10
	1, 3-butylene glycol	3
	Caustic potash	0.25
5	Stearic acid	2
	Stearic acid monoglyceride	2
	Cetanol	1
	Liquid petrolatum	5
	Petrolatum	2
10	Anti-bacterial zeolite B	1
	Trisodium ethylenediaminehydroxyethyl triacetate	0.01

Example 1-16: Gel

15	Purified water	63.27 mass %
	Chlorhydroxy aluminum	20
	Dipropylene glycol	5
	PEG 1500	5.5
	Carboxyvinyl polymer	0.4
20	Methylcellulose	0.2
	POE(15) oleyl alcohol ether	0.5
	Potassium hydroxide	0.1
	EDTA	0.02
	Anti-bacterial zeolite B	5
25	Trisodium ethylenediaminehydroxyethyl triacetate	

0.01

Example 1-17: Wet sheet

Purified water	62.81 mass %
5 Anhydrous ethyl alcohol	35
Polyoxyethylene hydrogenated castor oil	
	0.1
Citric acid (food)	0.02
Sodium citrate	0.06
10 Anti-bacterial zeolite B	2
Trisodium ethylenediaminehydroxyethyl triacetate	
	0.01

[Invention of claims 2-6]

15 Examples 2-1 to 2-3, Comparative examples 2-1 to 2-4  
[Deodorant powder spray]

Deodorant powder sprays having compositions of Examples 2-1 to 2-3 and Comparative examples 2-1 to 2-4, shown in Table 2-1, were prepared with the 20 following preparation method, and the stability (anti-discoloration properties), usability, and the deodorizing effect of the formulations were evaluated with the method described below. The evaluation results are also shown in Table 2-1.

25 Preparation method

The powder ingredients are thoroughly mixed with a Henschel mixer to prepare the powder portion. The oil ingredients, surfactant and such are mixed and dissolved with a blender to prepare the oil phase portion. An aluminum aerosol can with an inside volume of 80 mL is filled with 5.3 g of the powder portion and 2.9 g of the oil phase portion; after clinching, the propellant (LPG 0.18 MPa/20°C) is added to obtain a powder spray.

10 (1) Usability

The following tests were conducted using the deodorant sprays that had been stored undisturbed at room temperature for 6 months. 40 test subjects sprayed Examples and Comparative examples on either 15 their left or right armpit from 10 cm away for three seconds and then spread the sample with a hand to conduct a sensory evaluation of the tactile sensation during use. Graininess is believed to be caused by aggregation of the powder.

20 <Evaluation criteria>

The number of test subjects who determined the tactile sensation during use was without graininess after the sensory evaluation was indicated.

A: 32 or more

25 B: 20 or more and 31 or less

C: 19 or less

(2) Deodorizing effect (armpit odor)

In summer when perspiration tends to occur, 40 male panelists who were aware of their armpit odor 5 were used in the following method and a judge conducted sensory evaluation. The test samples were randomly allotted (left and right were separate); one person who is not a panelist or a judge was in charge of sample allotment and maintenance of the allotment 10 key codes for the purpose of the double-blind testing.

Armpits of the panelists were wiped with 70% ethanol until they didn't smell, and the samples were used from 10 cm away for three seconds. Each panelist was prohibited from bathing, showering, or cleaning the 15 armpits; after 24 hours the judge evaluated the degree of smell from the left and right armpits using the following criteria.

The evaluation was based on the six-point method based on the following criteria; the average of 40 20 male panelists was used for the evaluation results.

A higher number indicates stronger smell.

(Evaluation)

0 points: No smell

1 point: Very faint smell

25 2 points: Faint smell

3 points: Medium smell

4 points: Somewhat strong smell

5 points: Strong smell

#### Evaluation results

5 A: 0 points or more and less than 2 points

B: 2 points or more and less than 3 points

C: 3 points or more

#### (3) Anti-discoloration properties

The deodorant powder spray in an aerosol

10 container was sprayed on white sheets of paper from approximately 10 cm away for three seconds to prepare samples; samples after being exposed to sunlight for three hours were compared with those with no sunlight exposure to ascertain whether the color of each sample  
15 changed or not; evaluation was conducted visually by specialized researchers. The evaluation criteria are as follows. Samples with less color changes are more preferable for commercial products and have more formulation stability.

#### 20 <Evaluation criteria>

A: No color change is detected.

B: Slight color change is detected.

C: Obvious color change is detected.

#### 25 Table 2-1

	Examples 2-1	Examples 2-2	Examples 2-3	Comparative example 2-1	Comparative example 2-2	Comparative example 2-3	Comparative example 2-4
a	10.0	3	6	10.0	10.0	—	—
b	4.0	4	3	—	—	4	4
c	—	—	—	28.0	—	28.0	—
d	10.0	10.0	10.0	10.0	10.0	10.0	10.0
e	6.0	6.0	6.0	6.0	6.0	6.0	6.0
f	25.0	32.0	30.0	1.0	29.0	7.0	35.0
g	0.7	0.7	0.7	0.7	0.7	0.7	0.7
h	0.3	0.3	0.3	0.3	0.3	0.3	0.3
i	0.9	0.9	0.9	0.9	0.9	0.9	0.9
j	18.0	18.0	18.0	18.0	18.0	18.0	18.0
k	9.08	9.08	9.08	9.08	9.08	9.08	9.08
l	13.0	13.0	13.0	13.0	13.0	13.0	13.0
m	1.0	1.0	1.0	1.0	1.0	1.0	1.0
n	2.0	2.0	2.0	2.0	2.0	2.0	2.0
o	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Usability	35 A	37 A	39 A	4 C	20 B	19 C	29 B
Deodorizing effect	A	A	A	A	B	C	C
Color stability	A	A	A	C	B	A	A

#### Powder ingredients

- a: Zeolite containing silver, zinc, and ammonium  
(Zeomic AJ10N from Sinanen Zeomic Co., Ltd.: average particle size is approximately 1.5 micrometers and 5 0.5% or less have a particle size over 15 micrometers.)
- b: Alum (average particle size 1 micrometer)
- c: Chlorhydroxy aluminum
- d: Zinc oxide
- 10 e: Spherical calcium alginate

f: Starch  
g: Calcium stearate  
h: Magnesium metasilicate aluminate  
i: Spherical polyethylene powder (average particle  
5 size 12 micrometers)  
Oil components and surfactants  
j: Cetyl octanoate  
k: Dimethyl polysiloxane (6 mPa·s, 25°C)  
l: Methylphenyl polysiloxane (13 mPa·s, 25°C)  
10 m: Sorbitan sesquiisostearate  
n: PPG-13-Decyltetradeceth-24  
o: Natural vitamin E

The aforementioned Examples and Comparative examples show that the deodorant powder sprays of the 15 present invention are superior in terms of usability, deodorizing properties, and anti-discoloration properties compared with Comparative examples.

Also, the deodorant powder sprays of Examples did not exhibit powder aggregation and had superior 20 dispersibility.

Other Examples of the skin treatment composition of the present invention are shown below.

Example 2-4  
25 [Pressed powder type deodorant cosmetic]

(Powder portion)

Zeolite containing silver ions and ammonium ions  
(average particle size is approximately 3  
micrometers; 0.5% or less have a particle size over  
5 15 micrometers.)

4.0 mass %

Alum (average particle size 0.05 micrometers)

1.5

Chlorhydroxy aluminum 0.5

Zinc oxide 3.0

10 Talc 87.0

(Oil components)

Methylphenyl polysiloxane (13 mPa·s, 25°C)

3.0

Liquid petrolatum 1.0

15 (Additives)

Perfume Appropriate amount

(Preparation method) The powder portion is mixed with  
a Henschel mixer; the oil components and the additive  
are added to this mixture, which is then crushed with  
20 a 5HP pulverizer (from Hosokawa Micron Ltd.) and  
molded in a medium plate to obtain a pressed powder  
type deodorizing cosmetic.

The obtained pressed powder type deodorizing  
cosmetic does not exhibit caking during use, and has  
25 good usability (no graininess) as well as sufficient

deodorizing effects and anti-discoloration properties.

Example 2-5

5 [Deodorant powder]

Dried alum (average particle size 4 micrometers)

13.0 mass %

Zeolite containing silver ions and ammonium ions

(average particle size is approximately 2

10 micrometers; 1% or less have a particle size over 15  
micrometers.)

7.0

Spherical nylon powder 5.0

Dimethyl polysiloxane (molecular weight 450,000)

1.0

15 Synthesized isoparaffin 1.0

Perfume Appropriate amount

Talc 73.0

(Preparation method) The aforementioned ingredients are mixed one after another with a Henschel mixer to 20 obtain deodorant powder. The obtained deodorant powder has superior usability (no graininess), deodorizing effects, and anti-discoloration properties.

25 Example 2-6

[Deodorant powder spray]

(Powder portion)

Dried alum (average particle size 5 micrometers)

4.0 mass %

5 Chlorhydroxy aluminum 2.0  
Zeolite containing silver ions, copper ions and ammonium ions (average particle size is approximately 1.5 micrometers; 0.5% or less have a particle size over 15 micrometers.) 1.0

10 Talc 0.5

(Oil components)

Decamethylcyclopentasiloxane 1.5

Perfume 0.2

(Propellant)

15 Isopentane 10.0

Liquefied petroleum gas 80.8

(Preparation method) The powder portion is mixed with a kneader and the oil components are mixed with a blender; a spray can is filled with each of these one after another, and then filled with the propellant to obtain a powder spray.

The obtained powder spray has good dispersibility in the propellant and exhibit no clogging of the nozzle while spraying; it is also superior in terms of the deodorizing effect and

anti-discoloration properties.

Example 2-7

[Powder spray]

5 (Powder portion)

Alum (average particle size 20 micrometers)

3.0 mass %

Zeolite containing silver ions, zinc ions and ammonium ions (average particle size is approximately

10 5 micrometers; 1% or less have a particle size over  
15 micrometers.) 2.0

Zinc oxide 0.2

Silica 1.5

(Oil components)

15 Polyoxyethylene nonylphenyl ether 0.5

Dimethyl polysiloxane (20 mPa·s, 25°C)

0.1

Isopropyl myristate 0.5

(Additives)

20 Polyoxyethylene sorbitan monooleate 0.1

Perfume 0.1

(Propellant)

Liquefied petroleum gas 92.0

(Preparation method) The powder portion is mixed with  
25 a kneader and the oil components are mixed with a

blender, to which the additives are added; a spray can is filled with each of these one after another, and then filled with the propellant to obtain a powder spray.

5 The obtained powder spray has good dispersibility in the propellant and exhibit no clogging of the nozzle while spraying; it is also superior in terms of the deodorizing effect and anti-discoloration properties.

10

### Example 2-8

### [Compact type deodorant powder]

(Powder portion)

Dried alum (average particle size 0.5 micrometers)

15 10.0 mass %

Zeolite containing copper ions, zinc ions and ammonium ions (average particle size is approximately 1.5 micrometers; 0.1% or less have a particle size over 15 micrometers.) 10.0

20 Talc 60.0

(oil components)

Methylphenyl polysiloxane (13 mPa·s, 25°C)

10.0

Liquid petrolatum 10.0

25 (Preparation method) The powder portion is mixed with

a Henschel mixer; the oil components are added to this mixture, which is then crushed with a 5HP pulverizer (from Hosokawa Micron Ltd.) and molded in a medium plate to obtain a compact type deodorant cosmetic.

- 5 The obtained compact type deodorant powder has superior usability (no graininess), deodorizing effects, and anti-discoloration properties.

### Example 2-9

- ## 10 [Deodorizing spray]

(Powder portion)

Alum (average particle size 10 micrometers)

1.0 mass %

## Zeolite containing zinc ions and ammonium ions

- 15 (average particle size is approximately 5  
micrometers; 5% or less have a particle size over 15  
micrometers.) 3.0

Zinc oxide 2.0

(oil components)

## Decamethylcyclon

- (Additives)

*Lacanopeltis manicata* 0.5

#### Diglycidal carbamate tetrakis-2-ethylhexanoate

95

- ### 25 (Propellant)

n-butane	75.0
i-butane	13.0

(Preparation method) The powder portion is mixed with a kneader and the oil components and the additives are  
5 mixed with a blender; a spray can is filled with each of these one after another, and then filled with the propellant to obtain a deodorizing spray.

The obtained deodorizing spray is superior in terms of dispersibility of the powder in the  
10 propellant, and has superior usability (no graininess), deodorizing effects, and anti-discoloration properties.

#### Example 2-10

15 [Baby powder]

(Powder portion)

Dried alum (average particle size 50 micrometers)

15.0 mass %

Talc 65.3

20 Calcium carbonate 17.0

Zeolite containing silver ions and ammonium ions  
(average particle size is approximately 8  
micrometers; 1% or less have a particle size over 15  
micrometers.) 2.0

25 (Oil components)

Methylphenyl polysiloxane (13 mPa·s, 25°C)

0.4

Dimethyl polysiloxane/polyethylene glycol copolymer

0.1

5 (Additives)

Preservative 0.2

(Preparation method) The aforementioned ingredients are thoroughly stirred and mixed to obtain baby powder.

10 The obtained baby powder has superior usability (no graininess), deodorizing effects, and anti-discoloration properties.

Example 2-11

15 [Deodorant stick]

Methyl trimeticone 60.0 mass %

Squalane 10.0

Hydrocarbon wax 10.0

Alum (average particle size 0.05 micrometers)

20 5.0

Zeolite containing zinc ions and ammonium ions (average particle size is approximately 10 micrometers; 20% or less have a particle size over 15 micrometers.) 15.0

25 (Preparation method) The aforementioned

ingredients are mixed and a container is filled with the mixture to obtain a deodorant stick.

The obtained deodorant stick, when applied to armpits, exhibits superior usability (no graininess),  
5 deodorizing effects, and anti-discoloration properties.

Example 2-12

[Roll-on deodorizing agent]

10	Dodecamethylcyclohexasiloxane	67.0 mass %
	Ethanol	20.0
	Sorbit	4.0
	Dried alum (average particle size 1 micrometer)	
		1.0
15	Aluminum chloride	1.0
	Magnesium oxide	2.0
	Zeolite containing silver ions, copper ions and ammonium ions (average particle size is approximately 2 micrometers; 3% or less have a particle size over	
20	15 micrometers.)	5.0
	(Preparation method) The aforementioned ingredients are mixed and to into a roll-on container to obtain a roll-on deodorizing cosmetic.	

The obtained roll-on deodorizing cosmetic  
25 exhibits no aggregation of the powder and has superior

usability (no graininess), deodorizing effects, and anti-discoloration properties.

### Example 2-13

## 5 [Powder spray]

(Powder portion)

Alum (average particle size 0.01 micrometers)

2.0 mass %

Chlorhydroxy aluminum 0.5

10 Zeolite containing zinc ions, copper ions and ammonium ions (average particle size is approximately 1.5 micrometers; 0.5% or less have a particle size over 15 micrometers.) 1.0

Talc 0.5

## 15 (Oil components)

Decamethylcyclopentasiloxane 1.5

Perfume 0.2

## (Propellant)

Isopentane 10.0

20      Liquefied petroleum gas                          83.3  
  
(Preparation method) The powder portion is mixed  
with a kneader and the oil components are mixed with  
a blender; a spray can is filled with each of these  
one after another, and then filled with the propellant  
  
25      to obtain a powder spray.

The obtained powder spray has good dispersibility in the propellant and exhibit no clogging of the nozzle while spraying; it spreads well on the skin and is also superior in terms of 5 anti-perspiration properties, the deodorizing effect and anti-discoloration properties.

Example 2-14

[Powder spray]

10 (Powder portion)

Dried alum (average particle size 5 micrometers)

0.5 mass %

Zeolite containing silver ions, copper ions and ammonium ions (average particle size is approximately 15 1.0 micrometers; 0.05% or less have a particle size over 15 micrometers.) 1.5

Zinc oxide 0.2

Silica 1.5

(Oil components)

20 Polyoxyethylene nonylphenyl ether 0.5

Dimethyl polysiloxane (1.5 mPa·s, 25°C)

0.1

Isopropyl myristate 0.5

(Additives)

25 Polyoxyethylene sorbitan monooleate 0.1

Perfume	0.1
(Propellant)	
Liquefied petroleum gas	95.0
(Preparation method) The powder portion is mixed with 5 a kneader and the oil components are mixed with a blender; a spray can is filled with each of these one after another, and then filled with the propellant to obtain a powder spray.	

The obtained powder spray does not show  
10 aggregation of the powder components even after being  
stored for a long time and exhibits good usability as  
well as sufficient deodorizing effects and  
anti-discoloration properties.

15 Example 2-15

[Compact type deodorant powder]

(Powder portion)

Alum (average particle size 15 micrometers)

30.0 mass %

20 Zeolite containing silver ions, zinc ions and  
ammonium ions (average particle size is approximately  
1.5 micrometers; 1% or less have a particle size over  
15 micrometers.) 20.0

Talc 30.0

25 (Oil components)

Methylphenyl polysiloxane (13 mPa·s, 25°C)

10.0

Liquid petrolatum 10.0

(Preparation method) The powder portion is mixed with

5 a Henschel mixer; the oil components are added to this mixture, which is then crushed with a 5HP pulverizer (from Hosokawa Micron Ltd.) and molded in a medium plate to obtain a compact type deodorant cosmetic.

The obtained pressed powder type deodorant

10 cosmetic does not exhibit caking during use, gives a good tactile sensations during use, and has sufficient deodorizing effects and anti-discoloration properties.

15 Example 2-16

[Deodorizing spray]

(Propellant)

n-butane 76.0 mass %

i-butane 15.0

20 (Oil components)

Dimethyl polysiloxane (1.5 mPa·s, 25°C)

5.0

(Powder portion)

Dried alum (average particle size 4.5 micrometers)

25 2.5

Zeolite containing zinc ions and ammonium ions  
(average particle size is approximately 0.5  
micrometers; 1% or less have a particle size over 15  
micrometers.) 0.5

5 (Additives)

Isopropyl myristate 0.5  
Diglycerol sorbitan tetra-2-ethylhexanoate  
0.5

(Preparation method) The powder portion is mixed  
10 with a kneader and the oil components and the  
additives are mixed with a blender; a spray can is  
filled with each of these one after another, and then  
filled with the propellant to obtain a deodorizing  
spray.

15 The obtained deodorizing spray exhibits good  
dispersibility of the powder portion in the  
propellant, gives nice smooth tactile sensations, and  
exhibits sufficient deodorizing effects and  
anti-discoloration properties.

20

Example 2-17  
[Baby powder]  
(Powder portion)

Talc 55.0 mass %  
25 Alum (average particle size 25 micrometers)

		25.0
Calcium carbonate		17.0
Zeolite containing silver ions, copper ions, and ammonium ions (average particle size is approximately 5 micrometers; 20% or less have a particle size over 15 micrometers.)		2.3
(Oil components)		
Methylphenyl polysiloxane (13 mPa·s, 25°C)		0.4
10 Dimethyl polysiloxane/polyethylene glycol copolymer (Additives)		0.1
Preservative		0.2
15 (Preparation method) The aforementioned ingredients are thoroughly stirred and mixed to obtain baby powder.		
The obtained baby powder does not aggregate, gives smooth sensations during use, and exhibits superior deodorizing effects and anti-discoloration properties.		
20		

#### Example 2-18

[Deodorant stick]

Methyl trimeticone	60.0 mass %
25 Squalane	10.0

Hydrocarbon wax	10.0
Zeolite containing silver ions, copper ions and ammonium ions (average particle size is approximately 1.5 micrometers; 1.5% or less have a particle size over 15 micrometers.)	10.0
Dried alum (average particle size 7 micrometer)	9.0
Aluminum/zirconium hydroxychloride	1.0
(Preparation method) The aforementioned ingredients are mixed and a container is filled with the mixture to obtain a deodorant stick.	
The obtained deodorant stick, when applied to armpits, gives nice smooth tactile sensations and exhibits superior deodorizing effects and anti-discoloration properties.	

#### Example 2-19

[Roll-on deodorizing cosmetic]

Dodecamethylcyclohexasiloxane	51.0 mass %
Ethanol	20.0
Sorbit	4.0
Zeolite containing copper ions and ammonium ions (average particle size is approximately 10 micrometers; 10% or less have a particle size over 15 micrometers.)	5.0

Alum (average particle size 32 micrometers)

15.0

Aluminum/zirconium hydroxychloride 5.0

(Preparation method) The aforementioned

5 ingredients are mixed and put into a roll-on container  
to obtain a roll-on deodorizing cosmetic.

The obtained roll-on deodorizing cosmetic  
exhibits no aggregation of the powder portion, gives  
refreshing sensation during use and smoothes the skin,  
10 and has superior deodorizing effects and  
anti-discoloration properties.

Example 2-20

[Body cleanser]

15 Triethanolamine N-lauryl-L-glutamate 6.0 mass %  
Sodium N-lauryl methyl taurate 3.0  
Triethanolamine laurate 9.5  
Triethanolamine myristate 9.5  
Lauryl imidazolinium betaine 5.0  
20 Lauryl diethanol amide 5.0  
Propylene glycol 7.0  
Zeolite containing silver ions and ammonium ions  
(average particle size is approximately 5  
micrometers; 5% or less have a particle size over 15  
25 micrometers.) 0.5

	Dried alum (average particle size 0.01 micrometers)	
		1.0
	Aluminum chloride	0.3
	Chlorhydroxy aluminum	0.2
5	Methylphenyl polysiloxane (13 mPa·s, 25°C)	
		1.0
	Purified water	Balance
	Perfume	0.01
	Preservative	0.1
10	Sodium ethylenediaminetetraacetate	0.01
	(Preparation method) Purified water is heated up to 70°C and other ingredients were added one after another and stirred and dissolved. The mixture is cooled down to the ordinary temperature and put into 15 a resin bottle containing stirring balls to obtain a body cleanser.	
	The obtained body cleanser has cleaning power and foaming power, while maintaining good system stability and usability (no graininess) as well as 20 superior deodorizing effects and anti-discoloration properties.	
	Example 2-21	
	[Carmine lotion]	
25	Ethanol	12.5 mass %

(Oil components)

Methyl trimeticone	2.0
(Humectant)	
Glycerin	2.0
5 1, 3-butylene glycol	2.0
(Powder agent)	
Iron oxide (red iron oxide)	0.15
Zinc oxide	0.5
Zeolite containing silver ions and ammonium ions	
10 (average particle size is approximately 1.5 micrometers; 0.2% or less have a particle size over 15 micrometers.)	0.5
Alum (average particle size 36 micrometers)	
	0.5
15 Kaolin	1.5
(Drugs)	
Camphor	0.2
Phenol	0.02
Perfume	0.01
20 Anti-fading agent	0.01
Purified water	Balance
(Preparation method) The perfume was added to ethanol, the humectant, and the oil components and dissolved.	
Camphor and phenol were dissolved in purified water,	
25 to which the powder agent, anti-fading agent, and the	

aforementioned ethanol humectant phase were added and stirred to wet-disperse the powder agent.

Filtration was done with approximately 160 mesh to obtain carmine lotion.

5 The aforementioned carmine lotion has the effect of reducing the burning sensation after sun exposure and is superior in terms of usability with no graininess, deodorizing effects and anti-discoloration properties.

10

### Example 2-22

### [Essence oil]

### (oil components)

Olive oil 39.69 mass %

15 Liquid petrolatum 25.0

Squalane 20.0

(Powder)

## D i m e t h y l

Dimethyl polysiloxane (6 mPa·s, 25°C) 3.0  
Zeolite containing silver ions, zinc ions and ammonium ions (average particle size is approximately 5 micrometers; 20% or less have a particle size over 15 micrometers.) 2.0

Dried alum (average particle size 3 micrometer)

10.0

25 (Others)

Vitamin E acetate	0.2
Antioxidant	0.1
Perfume	0.01

(Preparation method) The oil obtained by adding the  
5 powder drugs, antioxidant, and perfume to the oil  
components is put into a resin bottle containing  
stirring balls to obtain essence oil.

The aforementioned essence oil has good  
usability (no graininess) and is superior in terms of  
10 deodorizing effects and anti-discoloration  
properties.

#### Example 2-23

[Facial wash]

15 (Fatty acid)

Stearic acid	10.0 mass %
Palmitic acid	10.0
Myristic acid	10.0
Lauric acid	4.0

20 (Oil components)

Methylphenyl polysiloxane (13 mPa·s, 25°C)  
2.0

(Alkali)

Potassium hydroxide 6.0

25 (Humectant)

PEG 1500	10. 0
Glycerin	15. 0
(Surfactant)	
Glyceryl monostearate	2. 0
5 POE(20) sorbitan monostearate	2. 0
(Powder)	
Zeolite containing silver ions and ammonium ions (average particle size is approximately 10 micrometers; 20% or less have a particle size over 15 10 micrometers.)	2. 0
Alum (average particle size 9 micrometers)	
	2. 0
Preservative	0. 1
Sodium ethylenediaminetetraacetate	0. 05
15 Perfume	0. 01
Purified water	Balance
(Preparation method) The fatty acid, oil components, humectant, and preservative are heated and dissolved; the temperature is maintained at 70°C. The purified 20 water, in which the alkali is already dissolved, is added to the oil phase while stirring. After the addition, the temperature is maintained at 70°C to complete the neutralization reaction. The surfactant, chelating agent, perfume, and perfume are 25 dissolved and added; after stirring and mixing,	

deaeration, and filtration, the mixture is cooled to obtain the facial wash.

The aforementioned facial wash has superior cleaning power and foaming power as well as good 5 usability without graininess; it also has superior deodorizing effects and anti-discoloration properties.

Example 2-24

10	[Facial mask (peel-off type)]	
	(Film agent)	
	Polyvinyl acetate emulsion	15.0 mass %
	Polyvinyl alcohol	10.0
	(Humectant)	
15	Sorbitol	5.0
	PEG 400	5.0
	(Oil components)	
	Jojoba oil	2.0
	Methylphenyl polysiloxane (13 mPa·s, 25°C)	
20		1.0
	Squalane	1.0
	(Surfactant)	
	POE sorbitan monostearate	1.0
	(Powder)	
25	Titanium oxide	4.0

Zeolite containing silver ions and ammonium ions  
 (average particle size is approximately 1.5  
 micrometers; 2% or less have a particle size over 15  
 micrometers.) 3.0

5 Dried alum (average particle size 45 micrometer)  
   4.0

Talc  
   4.0  
    (Alcohol)

Ethanol    8.0

10 Perfume    0.01

Preservative    0.1

Purified water    Balance

(Preparation method) The powder is added to the  
 purified water and thoroughly dispersed, to which the  
 15 humectant is added; after heating up to 70-80°C, the  
 film agent is added and dissolved. The perfume,  
 preservative, surfactant, and oil components are  
 added to the ethanol. This is added to the  
 aforementioned water phase and mixed. After  
 20 deaeration, filtration, and cooling, a facial mask is  
 obtained.

The aforementioned facial mask has superior  
 usability (no graininess), deodorizing effects, and  
 anti-discoloration properties.

Example 2-25

[Pressed powder]

(Powder)

Alum (average particle size 0.4 micrometers)

5		50.0 mass %
	Chlorhydroxy aluminum	1.0
	Zeolite containing silver ions, zinc ions and ammonium ions (average particle size is approximately 6 micrometers; 15% or less have a particle size over 10 micrometers.)	5.0
10	Talc	37.0
	(Oil components)	
	Liquid petrolatum	2.0
	Methylphenyl polysiloxane (13 mPa·s, 25°C)	
15		1.0
	Perfume	Appropriate amount
	(Preparation method) After thoroughly mixing the powder components, the perfume, dissolved in the oil components, is uniformly sprayed and mixed. This powder is crushed and then pressure molded to obtain pressed powder.	

The aforementioned pressed powder has superior usability (no graininess), deodorizing effects, and anti-discoloration properties.

Example 2-26

[Soup]

Sodium lauryl monoglyceride sulfate Balance

Sodium laurylsulfate 10.0 mass %

5 Sodium cocoate 30.0

Cetyl alcohol 3.5

Methylphenyl polysiloxane (13 mPa·s, 25°C)

0.5

Zeolite containing silver ions and ammonium ions

10 (average particle size is approximately 1.5 micrometers; 1% or less have a particle size over 15 micrometers.) 1.0

Dried alum (average particle size 5 micrometer)  
4.0

15 Perfume 0.01

Dye 0.01

Antioxidant 0.1

Sodium ethylenediaminetetraacetate 0.01

(Preparation method) The aforementioned ingredients  
20 are put into a mixer for mixing and stirring, and then kneaded and compressed with a roll and plotter; the mixture is then shaped into a bar and extruded and molded to obtain soap.

The aforementioned soap has superior usability  
25 (no graininess), deodorizing effects, and

anti-discoloration properties.

Example 2-27

[Emollient lotion]

5 (Oil components)

Cetyl alcohol	1.0	mass %
Beeswax	0.5	
Petrolatum	2.0	
Squalane	6.0	

10 Dimethyl polysiloxane (1.5 mPa·s, 25°C)

2.0

(Alcohol)

Ethanol	5.0
(Humectant)	

15 Glycerin 4.0

1, 3-butylene glycol	4.0
----------------------	-----

(Surfactant)

POE (10) monooleic ester	1.0
--------------------------	-----

Glyceryl monostearate	1.0
-----------------------	-----

20 (Viscous fluid)

Quince seed extract (5% aqueous solution)	
---	--

20.0

(Powder)

Zeolite containing silver ions, zinc ions and

25 ammonium ions (average particle size is approximately

3.5 micrometers; 5% or less have a particle size over  
15 micrometers.) 2.0

Alum (average particle size 12 micrometers)  
1.0

5 Phenoxyethanol 0.05

Coloring agent 0.01

Perfume 0.01

Purified water Balance

(Preparation method) The humectant and coloring agent  
10 are added to the purified water and the temperature  
is raised and adjusted to 70°C. The surfactant and  
preservative are added to the oil components and the  
temperature is raised and adjusted to 70°C. This is  
added to the aforementioned water phase to carry out  
15 preliminary emulsification. The quince seed extract,  
powder, and ethanol are added to this, followed by  
stirring; after homogenizing the emulsified  
particles using a homomixer, the mixture is deaerated,  
filtered, and cooled to obtain an emollient lotion.

20 The aforementioned emollient lotion has  
superior usability (no graininess), deodorizing  
effects, and anti-discoloration properties.

Example 2-28

25 [Oil-based gel (emulsified type)]

(Oil components)

Liquid petrolatum	10.0 mass %
Glycerol tri-2-ethylhexanoate	48.0
Decamethylcyclopentasiloxane	2.0

5 (Humectant)

Sorbitol	10.0
PEG 400	5.0

(Surfactant)

Sodium lauroylmethyltaurate	5.0
-----------------------------	-----

10 POE octyldodecyl alcohol ether 10.0

(Powder)

Zeolite containing silver ions, zinc ions and ammonium ions (average particle size is approximately 2.0 micrometers; 3% or less have a particle size over 15 micrometers.) 2.0

Dried alum (average particle size 18 micrometer) 2.0

Perfume 0.01

Purified water Balance

20 (Preparation method) The humectant and acylmethyltaurine are added to the purified water and the temperature is raised and adjusted to 70°C. POE octyldodecyl ether and perfume are added to the oil components and the temperature is raised and adjusted 25 to 70°C. This and the powder are gradually added to

the aforementioned water phase. After homogenizing the emulsified particles using a homomixer, the mixture is deaerated, filtered, and cooled to obtain an oil based gel.

5 The aforementioned oil based gel has superior  
usability (no graininess), deodorizing effects, and  
anti-discoloration properties.

### Example 2-29

10 [Cream]

(oil components)

Cetyl alcohol	5.0	mass %
Stearic acid	3.0	
Methylphenyl polysiloxane (13 mPa·s, 25°C)		
15	1.0	
Petrolatum	4.0	
Squalane	9.0	
Glycerol tri-2-ethylhexanoate (Humectant)	7.0	
20 Dipropylene glycol	5.0	
Glycerin (Surfactant)	5.0	
Propylene glycol monostearate	3.0	
POE(20) cetyl alcohol ether	3.0	
25 (Alkali)		

Triethanolamine (Powder)	1.0
Zeolite containing silver ions and ammonium ions (average particle size is approximately 1.5 5 micrometers; 1.5% or less have a particle size over 15 micrometers.)	1.0
Alum (average particle size 0.9 micrometers)	0.1
Preservative	0.1
10 Antioxidant	0.05
Perfume	0.01
Purified water	Balance
(Preparation method) The humectant and alkali are added to the purified water and the temperature is 15 raised and adjusted to 70°C. The oil components are heated and dissolved, to which the surfactant, preservative, antioxidant, and perfume are added and the temperature is adjusted to 70°C. This is added to the aforementioned water phase to carry out 20 preliminary emulsification. The powder is added and a homomixer is used to homogenize the emulsified particles, followed by deaeration, filtration, and cooling.	
The aforementioned cream has superior usability 25 (no graininess), deodorizing effects, and	

anti-discoloration properties.

Example 2-30

[Wet sheet]

5	Ion-exchanged water	65.38 mass %
	Ethanol	30.00
Zeolite containing silver ions, zinc ions, and ammonium ions (average particle size is approximately 3 micrometers; 1% or less have a particle size over 15 micrometers.)		
10		1.0
	Alum (average particle size 0.09 micrometers)	
		3.0
	Polyoxyethylene polyoxypropylene decyltetradecyl ether	0.4
15	Citric acid	0.04
	Sodium citrate	0.04
	Adenine	0.05
	Trisodium ethylenediaminehydroxyethyl triacetate	
		0.05
20	Camphor	0.01
	Menthol	0.03
	(Preparation method) The water soluble ingredients are thoroughly dissolved in the ion-exchanged water, to which the insoluble ingredients are added; the	
25	insoluble ingredients are well dispersed and at the	

same time non-woven fabric is soaked in the mixture and then put into an aluminum pouch pack.

The aforementioned wet sheet has superior usability (no graininess), deodorizing effects, and  
5 anti-discoloration properties.

Example 2-31

[Powder in puff]

Talc	69.66 mass %
10 Polymethylsilsesquioxane spherical powder	10.0
Spherical calcium alginate powder	3.0
Zeolite containing silver ions, zinc ions, and ammonium ions (average particle size is approximately 10 micrometers; 18% or less have a particle size over 15 micrometers.)	2.0
Dried alum (average particle size 6 micrometers)	5.0
Ethylparaben	0.1
20 Salicylic acid	0.2
Fine particle zinc oxide (average particle size 60 nm)	5.0
Zinc oxide-coated spherical polyethylene powder	5.0
25 Iron oxide (yellow)	0.015

Iron oxide (red) 0.025

(Preparation method) The aforementioned ingredients are thoroughly mixed with a Henschel mixer, and pulverized by a pulverizer; a non-woven bag is filled  
5 with this and then put into a puff.

The aforementioned powder in puff has superior usability (no graininess), deodorizing effects, and anti-discoloration properties.

10 Example 2-32

[Deodorant stick (wax type)]

Decamethylcyclopentasiloxane 0.1 mass %

Dimethyl polysiloxane (1.5 mPa·s, 25°C)

10.0

15 Stearyl alcohol 8.0

Polyoxypropylene (40) butyl ether 7.0

Sorbitan sesquisostearate 2.5

Hydrogenated castor oil 1.5

Alum (average particle size 0.15 micrometers)

20 20.0

Zeolite containing silver ions, zinc ions, and ammonium ions (average particle size is approximately 3.0 micrometers; 10% or less have a particle size over 15 micrometers.) 18.0

25 Talc 10.7

Fine particle zinc oxide (average particle size 60 nm)

	1. 0
Hydroxypropyl- $\beta$ -cyclodextrin	0. 1
Zinc oxide-coated spherical nylon 12	
5	1. 0
Disodium calcium ethylenediaminetetraacetate	
	0. 1

(Preparation method) The oil components are heated, melted, and thoroughly mixed, to which the powder 10 ingredients are added; the mixture is then homogeneously dispersed and mixed with a homomixer while being heated, and then poured into a mold and cooled to obtain a stick.

The aforementioned deodorant stick has superior 15 usability (no graininess), deodorizing effects, and anti-discoloration properties.

Example 2-33

[Deodorant stick (non-oil type)]

20	Talc	49. 0 mass %
	Sericite	20. 0
	(Dimeticone/vinyl dimeticone) cross polymer	
	spherical powder	5. 0
	Dried alum (average particle size 4 micrometers)	
25		10. 0

Polymethylsilsesquioxane spherical powder

5.0

Zeolite containing silver ions, zinc ions, and ammonium ions (average particle size is approximately

5 0.9 micrometers; 0.3% or less have a particle size over 15 micrometers.) 10.0

Aluminum magnesium silicate 1.0

(Preparation method) One weight-part of aluminum magnesium silicate and 20 parts of ion-exchanged

10 water are mixed to obtain gel; the other ingredients are thoroughly mixed and dispersed into it to obtain slurry, which is poured into a mold, put into a dryer to evaporate the moisture, and then cooled to obtain a stick.

15 The aforementioned deodorant stick has superior usability (no graininess), deodorizing effects, and anti-discoloration properties.

Example 2-34

20 [Water based gel]

POE (14) POP (7) dimethyl ether 7.0 mass %

PEG 1500 8.0

Zeolite containing silver ions, copper ions, and ammonium ions (average particle size is approximately

25 5 micrometers; 20% or less have a particle size over

15 micrometers.)	1.0
Alum (average particle size 10 micrometers)	
	3.0
Carboxyvinyl polymer	0.4
5 Methylcellulose	0.2
POE (15) oleyl alcohol ether	1.0
Potassium hydroxide	0.1
$\epsilon$ -polylysine	0.2
Tetrasodium edetate	0.05
10 Perfume	0.1
Purified water	78.95

(Preparation method) The water soluble polymer is homogeneously dissolved in the purified water and then  $\epsilon$ -polylysine and tetrasodium edetate are 15 dissolved. The surfactant is added to the POE (14) POP (7) dimethyl ether and heated/dissolved, to which the perfume is added. The previously prepared water phase is gradually added, and finally the potassium hydroxide aqueous solution is added and thoroughly 20 stirred for neutralization.

The aforementioned water based gel has superior usability (no graininess), deodorizing effects, and anti-discoloration properties.

25 Example 2-35

[Medicated body cleanser]

Triethanolamine lauryl sulfate (40% aqueous solution)	40.0 mass %
Sodium lauryl polyoxyethylene (3 mole) sulfate (30% aqueous solution)	20.0
Lauryl diethanolamide	5.0
Zeolite containing silver ions, zinc ions, and ammonium ions (average particle size is approximately 3.5 micrometers; 1% or less have a particle size over 15 micrometers.)	2.0
Alum (average particle size 42 micrometers)	2.0
Glycerol palmitate	1.0
Lanolin derivative	2.0
Propylene glycol	5.0
Purified water	Balance
Perfume	Appropriate amount
Dye	Appropriate amount
Trisodium ethylenediaminehydroxyethyl triacetate (dihydrate salt)	Appropriate amount
(Preparation method) The water soluble ingredients are thoroughly mixed, to which the powder ingredients are added and thoroughly mixed and dispersed; the mixture is then put into a container. The container is shaken well before use.	

The aforementioned body cleanser has superior usability (no graininess), deodorizing effects, and anti-discoloration properties.

5 [Invention of claims 7-8]

Recipes shown in Table 3-1 and Table 3-2 were used to prepare powder lotion-type antiperspirant lotions and a prescribed amount (4 micrograms/cm<sup>2</sup>) is applied on clothing. The clothing was exposed to 10 sunlight (10 minutes) and washed with common laundry detergent in a washing machine; the degree of staining was then evaluated by visual observation. For Comparative examples, recipes not containing polyoxyethylene polyoxypropylene 2-decyldodecyl 15 ether (20-28 E.O.) (10-16 P.O.) and recipes containing polyoxyethylene (E.O. 60) were investigated. The degree of staining was evaluated by giving O to those that are within the acceptable range for skin treatment compositions, and X to those 20 that are outside of this range.

Table 3-1

	Examples			Comparative example			
	3-1	3-2	3-3	3-1	3-2	3-3	3-4
Ion-exchanged water	Balance	Balance	Balance	Balance	Balance	Balance	Balance
Ethanol (95%, synthesized)	50	50	50	50	50	50	50
Chlorhydroxy aluminum 50% aqueous solution (anti-perspirant)	20	20	20	20	20	20	20
Anti-bacterial zeolite A (preservative)	1	1	1	1	1	1	1
Polyoxyethylene polyoxypropylene 2-decyldodecyl ether (27 E.O.) (11 P.O.)	0.1	0.5	2.5	-	-	-	-
Polyoxyethylene (E.O. 60) hydrogenated castor oil	-	-	-	-	0.1	0.5	2.5
Total	100	100	100	100	100	100	100
Staining	O	O	O	X	X	X	X

Anti-bacterial zeolite A: Zeolite containing silver ions and zinc ions (average particle size approximately 1.5 micrometers)

Table 3-2

	Examples			Comparative example			
	3-4	3-5	3-6	3-5	3-6	3-7	3-8
Ion-exchanged water	Balance	Balance	Balance	Balance	Balance	Balance	Balance
Ethanol (95%, synthesized)	50	50	50	50	50	50	50
Chlorhydroxy aluminum 50% aqueous solution (anti-perspirant)	20	20	20	20	20	20	20
Anti-bacterial zeolite B (preservative)	1	1	1	1	1	1	1
Polyoxyethylene polyoxypropylene 2-decyldodecyl ether (27 E.O.) (11 P.O.)	0.1	0.5	2.5	-	-	-	-
Polyoxyethylene (E.O. 60) hydrogenated castor oil	-	-	-	-	0.1	0.5	2.5
Total	100	100	100	100	100	100	100
Staining	O	O	O	X	X	X	X

Anti-bacterial zeolite B: Zeolite containing silver ions, zinc ions, and ammonium ions (Zeomic AJ10N from Sinanen Zeomic Co., Ltd., average particle size 5 approximately 1.5 micrometers)

The aforementioned results indicate that staining is significant on Comparative examples not containing polyoxyethylene polyoxypropylene 10 2-decyldodecyl ether (20-28 E.O.) (10-16 P.O.) and Comparative examples containing polyoxyethylene (E.O. 60) instead of polyoxyethylene polyoxypropylene 2-decyldodecyl ether (20-28 E.O.) (10-16 P.O.).

On the other hand, Examples containing polyoxyethylene polyoxypropylene 2-decyldodecyl ether (20-28 E.O.) (10-16 P.O.) show very little staining, which is within the allowable range for skin treatment compositions; this indicates superior anti-staining effects.

Other Examples of the present invention are shown below.

10 Example 3-7: Pressed powder

Chlorhydroxy aluminum 5 mass %

Zinc oxide (zinc flower) 5

Talc Balance

Liquid petrolatum . 3

15 Anti-bacterial zeolite B 10

Polyoxyethylene polyoxypropylene 2-decyldodecyl ether (20 E.O.) (16 P.O.) 0.01

Example 3-8: Loose powder

20 Chlorhydroxy aluminum 5 mass %

Zinc oxide (zinc flower) 5

Talc Balance

Anti-bacterial zeolite B 10

Polyoxyethylene polyoxypropylene 2-decyldodecyl ether (22 E.O.) (15 P.O.) 0.05

Example 3-9: Lotion-type spray

(Stock solution recipe)

Purified water	10	mass %
5 Chlorhydroxy aluminum	10	
Anhydrous ethyl alcohol	Balance	
Isopropyl myristate	2	
1, 3-butylene glycol	3	
Anti-bacterial zeolite B	1	
10 Polyoxyethylene polyoxypropylene 2-decyldodecyl ether (26 E. O.) (13 P. O.)	1	

(Filler recipe)

Stock solution	50
LPG	50

15

Example 3-10: Powder spray

Chlorhydroxy aluminum	20	mass %
Silicic acid anhydride	15	
Talc	20	
20 Zinc oxide (zinc flower)	5	
Isopropyl myristate	Balance	
Dimethyl polysiloxane	10	
Sorbitan fatty acid ester	3	
Anti-bacterial zeolite B	5	
25 Polyoxyethylene polyoxypropylene 2-decyldodecyl		

ether (24 E. O.) (12 P. O.) 0.1  
(Filler recipe)

Stock solution 10

LPG 90

5

Example 3-11: Powder spray

Alum 20 mass %

Silicic acid anhydride 15

Talc 20

10 Zinc oxide (zinc flower) 5

Isopropyl myristate Balance

Polyoxyethylene/polyoxypropylene random polymer

methyl ether 10

Sorbitan fatty acid ester 3

15 Anti-bacterial zeolite B 5

Polyoxyethylene polyoxypropylene 2-decyldodecyl

ether (27 E. O.) (11 P. O.) 0.1

(Filler recipe)

Stock solution 10

20 LPG 90

Example 3-12: Stick

Chlorhydroxy aluminum 20 mass %

Talc 8

25 Zinc oxide (zinc flower) 5

Solid petrolatum wax	2
Stearyl alcohol	8
Liquid petrolatum	15
Cyclic dimethyl polysiloxane	Balance
5 Sorbitan fatty acid ester	1
Anti-bacterial zeolite B	5
Polyoxyethylene polyoxypropylene 2-decyldodecyl ether (22 E.O.) (15 P.O.)	4

10 Example 3-13: Cream

Purified water	Balance
Squalane	20 mass %
Cyclic dimethyl polysiloxane	15
Glyceryl diisostearate	3
15 Diethoxyethyl succinate	5
Organically modified montmorillonite	1.5
1,3-butylene glycol	5
Anti-bacterial zeolite A	5
Polyoxyethylene polyoxypropylene 2-decyldodecyl ether (24 E.O.) (13 P.O.)	2

Example 3-14: Emulsion

Purified water	Balance
Chlorhydroxy aluminum	20 mass %
25 Octyl-p-methoxycinnamate	5

	4-tert butyl-4'-methoxybenzoylmethane	1
	Hydrophobically treated zinc oxide	5
	Polyoxyethylene/polyoxypropylene random polymer	
	methyl ether	10
5	Silicone oil	15
	Silicone resin	1
	Glyceryl diisostearate	1
	Organically modified montmorillonite	0.5
	1, 3-butylene glycol	5.5
10	Anti-bacterial zeolite B	13
	Polyoxyethylene polyoxypropylene 2-decyldodecyl ether (25 E.O.) (11 P.O.)	1

Example 3-15: Ointment

15	Purified water	Balance
	Chlorhydroxy aluminum	20 mass %
	Glycerin	10
	1, 3-butylene glycol	3
	Caustic potash	0.25
20	Stearic acid	2
	Stearic acid monoglyceride	2
	Cetanol	1
	Liquid petrolatum	5
	Petrolatum	2
25	Anti-bacterial zeolite B	1

Polyoxyethylene polyoxypropylene 2-decyldodecyl  
ether (20 E.O.) (16 P.O.) 2.5

Example 3-16: Gel

5	Purified water	Balance
	Chlorhydroxy aluminum	20 mass %
	Dipropylene glycol	5
	PEG 1500	5.5
	Carboxyvinyl polymer	0.4
10	Methylcellulose	0.2
	POE(15) oleyl alcohol ether	0.5
	Potassium hydroxide	0.1
	EDTA	0.02
	Anti-bacterial zeolite B	5
15	Polyoxyethylene polyoxypropylene 2-decyldodecyl ether (26 E.O.) (12 P.O.)	0.3

Example 3-17: Wet sheet

	Purified water	Balance
20	Anhydrous ethyl alcohol	35 mass %
	Polyoxyethylene hydrogenated castor	0.1
	Citric acid (food)	0.02
	Sodium citrate	0.06
	Anti-bacterial zeolite B	2
25	Polyoxyethylene polyoxypropylene 2-decyldodecyl	

ether (26 E.O.) (12 P.O.) 0.01

#### INDUSTRIAL APPLICABILITY

(1) The present invention can provide a skin treatment composition containing anti-bacterial zeolite that exhibits the effect of preventing discoloration of the skin treatment compositions and/or reducing the degree of discoloration.

(2) The present invention can provide a skin treatment composition that is a deodorizing cosmetic containing anti-bacterial zeolite and also is superior in formulation stability such as anti-discoloring properties and dispersibility of powder components, as well as very superior in terms of the tactile sensation during use. The skin treatment composition of the present invention has superior usability (no graininess) because dispersibility of the powder ingredients such as anti-bacterial zeolite, alum, and dried alum is superior and the powder does not aggregate. It also has superior anti-discoloration properties.

(3) The present invention can provide a skin treatment composition containing anti-bacterial zeolite that exhibits the effect of preventing staining of clothing due to adhesion of the skin treatment

composition and/or reducing the degree of such staining.

The present invention is a skin treatment composition containing anti-bacterial zeolite that 5 exhibits the effect of preventing staining of clothing due to adhesion of the skin treatment composition and/or reducing the degree of such staining.